approach

DECEMBER 1970 THE NAVAL AVIATION SAFETY REVIEW

SAFETY STANDDOWN JANUARY 1971

Experience is the name everyone gives to their mistakes.
Oscar Wilde

THE CHRISTMAS HOLIDAYS are just around the corner so we'll take this opportunity to wish one and all a Merry Christmas and a Happy New Year. We also wish you a safe return to full flight operations after the holidays.

This year, as usual, it is expected that many aviation units will sharply curtail operations during the holidays in order to grant leave for the maximum number of personnel. This is fine and we wouldn't want it any other way, but it does pose some problems.

Many aircrewmen will be away from flying for several weeks. Such a layoff can adversely affect an aircrewman's knowledge and command of procedures which make up such an important part of flying. This problem should be corrected by study and review, OFT periods and warm-up/familiarization flights as appropriate prior to the resumption of full flight operations.

Ground support personnel, too, will need to review their duties and procedures as they readjust to the routine of full operations. They will also need sufficient time to carefully recheck the condition of all aircraft prior to flight since many of these aircraft may have been sitting inactive on the ground for extended periods.

Add the possibility of personnel fatigue resulting from social activity and extensive travel during the holidays, the potential problems posed by winter weather and, altogether, the layoff during the Christmas holidays will present problems which must receive careful attention.

During recent years, APPROACH has been calling attention to these problems. We have also advocated a more-or-less formal back-in-the-saddle program each January as being the best and safest way to make the transition from holiday routine back to full flight operations. This year is no exception. However, because of certain developments in the field of aviation safety, it is suggested that the usual back-in-the-saddle program be expanded into a comprehensive semi-annual safety review.

In July 1969, aviation commanders throughout the Navy ordered a safety standdown for the review of all activities connected with safety of flight. The duration of the standdown varied among units depending upon their employment, but in any event it was a Navy-wide evolution. In January 1970, another safety standdown was ordered. This time the standdown coincided with the period during which the annual back-in-the-saddle program is held. As a result, virtually every aviation unit in the Navy observed some kind of back-in-the-saddle program/safety standdown in January 1970 prior to resuming full flight operations after the holidays. Continued

Was the January 1970 safety standdown effective? All indications are that it was a huge success. In fact, the all-Navy major aircraft accident rate of .94 per 10,000 flight hours achieved in January 1970 was the lowest monthly rate for the entire year. This rate of .94 represents a substantial saving of resources when compared to losses in January during previous years, as the following tabulation shows:

	Rate	Major Accidents	Destroyed Aircraft
Jan 1970	.94	21	15
Jan 1969	1.83	52*	49*
Jan 1968	1.69	47	30
Jan 1967	2.01	57	30
Jan 1966	1.29	38	21
Jan 1965	1.14	32	17
Jan 1964	1.20	35	16
Jan 1963	1.84	49	26
Jan 1962	1.61	46	29
Jan 1961	2.15	58	32

*Includes USS ENTERPRISE accident statistics

It would be risky to attribute the low accident rate in January 1970 solely to the fact that a safety standdown was held. However, it does appear likely that this standdown was the single most important factor in achieving this rate. Any way you look at it, another safety standdown in January would certainly seem to be a worthwhile effort.

The specific plan for any safety standdown will logically vary from unit to unit, depending upon the size, composition, mission and operating environment. However, there are many things which are common to most units. It is these common factors which we will discuss as food for thought in planning for January 1971. As a starting point, let's consider an excerpt from a recent COMNAVAIRPAC message:

"The only approach to accident prevention is to:

- Know that flight and maintenance crews are currently professionally prepared to perform the assigned task.
- Know emergency procedures backwards and forwards.
- Meticulously prepare for all flight and maintenance operations.
- Forcefully discourage violations of accepted and established principles of air discipline."

These words just about cover the situation and very little can be added except perhaps to emphasize the importance of considering the operating environment. But, the question remains! How can a specific program be planned for a safety standdown which will achieve these goals? How can we know that flight and maintenance personnel are professionally prepared to perform assigned tasks? How can we ensure that pilots know emergency procedures cold?

As a first step in planning a safety standdown it is suggested that each activity survey all aspects of its operations. A CNAVANTRA message of March indicates how this can be done. This message stated, in part:

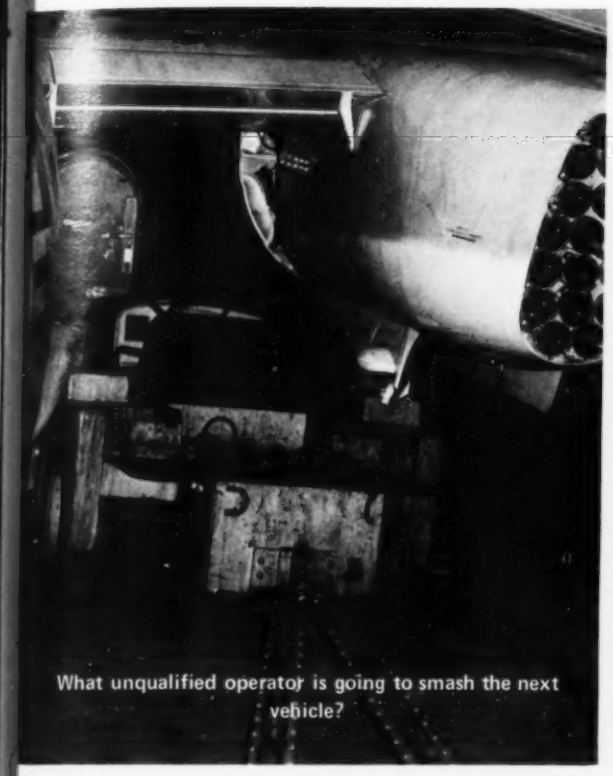
"All too often our safety efforts are directed toward analyzing what happened, why the accident, what broke first? In other words, *catch up*. Other aspects of our safety programs are directed toward preventive maintenance and are designed to detect possible malfunctions and ward off impending failure or to detect a potential cause before an accident happens. In furtherance of the latter concept, and to conserve limited assets and precious lives, it is imperative to get one jump ahead of the game.

"To do this, a *One Jump Ahead Council* has been established with its purpose to get one jump ahead of what potentially is the next accident likely to occur in this command. The Council will ask itself such questions as:

- What support equipment is likely to break next?
- What chain fall or overhead equipment is going to fail or fall down?
- What yellow equipment is about to suffer a steering casualty?
- What sprinkler system or fire extinguishing system will not work when needed?
- What unqualified, unlicensed, untrained operator is going to smash the next vehicle?
- What aircraft is going to fall off the wrong jack?
- What unlighted taxiway will be the scene of the next night taxi accident?
- What unswept ramp will cause FOD to the next engine?
- Which traffic patterns are likely to cause mid-airs?
- Which access plate will fly off the next aircraft?
- What practice bomb will fall in a school yard?
- Which student will overrotate on takeoff?"

The idea presented here is to look around. Study your environment, your operations, your aircraft. Make a conscious and systematic effort to develop foresight and isolate potential troubles before they occur. In planning the January 1971 standdown, apply this inquisitive attitude to every aspect of your operations. Ask yourself questions such as:

- Are there hazardous obstructions in approach zones, on runways and taxiways? If so, are flying



What unqualified operator is going to smash the next vehicle?

What unlighted runway will be the scene of the next night taxi accident?

Meticulously prepare for all flight and maintenance operations. (Is this proper equipment?)

What unswept ramp will cause FOD to the next engine?

personnel aware of them? Is anything being done to correct or remove the obstructions?

- Is there proper coordination of air traffic control between the tower and GCA? Is there proper coordination between the tower, crash crews and other personnel operating vehicles on the field?
- Are pilots aware of the type and location of field arresting gear? Do they know the limitations of each type?
- Are all pilots aware of their authority to take emergency action to insure safety of their aircraft?
- Do all pilots know their aircraft thoroughly? Do they know and understand their operating limitations? Their idiosyncracies? Do they know and understand the operation of all systems and installed equipment, including emergency systems?
- Are all flight leaders specially designated and fully qualified?
- Are briefing guides used to help insure all aspects of each flight are covered?
- Do all pilots fully understand the meaning of the designation "Pilot in Command."

The questions which we have posed here may appear to have been made up at random but they were not. Each of these questions was suggested by one or more aircraft accident reports on file at the Naval Safety Center. We could compose many additional questions but the point we wish to make is this: A good, searching survey of your operations will enable you to compose your own list of questions and thereby identify your specific problems, real or potential.

Once the problems have been identified, action can be taken to insure that they do not turn into accidents. It is suggested that the program of action be divided into the following segments:

- List and eliminate problems which can be corrected immediately.
- Draw up a priority list of problems which cannot be corrected immediately but which are to be corrected as soon as possible. Initiate action at the local level as appropriate. Originate recommendations and requests to higher authority when the problem is beyond local control.
- Establish a safety-oriented ground training syllabus for all flight and ground support personnel. Include a series of lectures on appropriate subjects. Back lectures up with a program for the full use of flight simulators, maintenance training devices and sessions on the line or in the shop using actual equipment. The list of subjects to be covered and the priority in which they are presented will depend upon your evaluation of problems and deficiencies uncovered during your survey. *The most important subjects should be covered in an intensive ground training lecture series to be held during the standdown.* The remaining subjects can be covered in a planned program extending over the next six months.

A safety standdown during the first part of January 1971 will enable each aviation unit to carefully assess its problems and deficiencies and take timely corrective action. This will not only insure that flight and ground support personnel are prepared for the resumption of full flight operations after the holidays but will continue to pay off throughout the year. Whether you call it a back-in-the-saddle program, a safety review or safety standdown is immaterial. The important point is this: The January 1970 safety standdown appears to have been very successful in reducing accidents during January 1970. Let's capitalize on this promising avenue to safety by planning a program for January 1971 which will provide benefits throughout the year. ◄

Something New

THE REQUIREMENT for a more responsive means of disseminating flight safety information of a cautionary nature has been the subject of numerous inputs from squadron commanding officers and safety officers and is recognized by the Commander, Naval Safety Center. In former years the reasonably prompt distribution of AARs (aircraft accident reports) to all operators of similar model aircraft and other interested parties filled this vacuum to a degree. Legal considerations now prohibit such distribution and, in part, led to the establishment of CROSSFEED and the quarterly Aircraft Accident Review. Neither of these, nor other Safety Center publications are, or can be, sufficiently responsive to satisfy the requirement. Accordingly, Commander Naval Safety Center is establishing a numbered *Flight Safety Advisory* message system to promulgate significant "Caution Alerts."

In general, these advisories will highlight a trend and common denominators not readily visible at other than the Safety Center level. The originating analyst will have license for "conjecture and suspicion" and it is hoped that similar inputs from operators will be encouraged.

Flight Safety Advisories

Flight Safety Advisories are not intended in any way to replace or compromise similar efforts throughout the operational chain of command. Rather, they should complement this effort.

Initial Flight Safety Advisories will be addressed to type commanders/controlling custodians as appropriate pending possible establishment of suitable address indicating groups. ◄

F-4 Poststall Gyrations and Upright Spin Characteristics

NAVAIRSYSCOM msg 050129Z of August 1970 advises that recent F-4 flight test results show that modifications to promulgated procedures should enhance recovery from poststall gyrations and upright spins. The message furnished the following advance information pending promulgation of specific changes in F-4B, RF-4B and F-4J NATOPS flight manuals:

Poststall Gyrations:

• Recovery from most departures from controlled flight will be effected rapidly with forward stick. Immediately upon aircraft departure from controlled flight, simultaneously neutralize ailerons and move the stick smoothly forward (to full forward, if necessary). Rudder should also be neutralized as forward stick is being applied. In some cases recovery will be effected before the stick reaches the full forward stop. The throttles should be retarded to idle to reduce the probability of flameout unless, in the pilot's opinion, the altitude is so low that thrust will be required to minimize altitude loss during the recovery dive and pull out. The drag chute can assist in recovery from most departures and should be deployed without hesitation if the aircraft does not recover after the application of full forward stick.

• The most positive indication of pending recovery is the unloading of the aircraft (zero or negative G). Large oscillation in pitch, roll and yaw may be present as the aircraft unloads. Full forward stick with neutral ailerons and rudder is the best means of reducing these oscillations and should be maintained until the oscillations stop. No attempt should be made to fly the AOA (angle-of-attack) indicator while large roll and yaw motions are present. The instrument is unreliable under these conditions.

• The following procedure is recommended when poststall gyrations (departures from controlled flight) are experienced:

(1) Stick forward smoothly (full forward if necessary).

(2) Ailerons and rudder – neutral.

(3) Throttles – IDLE (unless at low altitude).

(4) If not recovered – maintain full forward stick and deploy drag chute.

Upright Spins – Steep Oscillatory Mode:

• Use of full aileron with the spin, in addition to the full forward stick already applied for recovery from the poststall gyrations, will effect recovery from most spins within two turns for a symmetrically loaded configuration. (Asymmetrically loaded configurations will require more turns for recovery.) Aileron should not be applied until the pilot has ascertained that a spin condition exists. Visual cues, an excessive yaw rate and the turn needle should all be used to verify a spin condition and direction. Aircraft unloading and/or cessation of yaw rate is positive indication of pending spin recovery. At this point the ailerons should be neutralized; forward stick, however, should be maintained until residual roll and yaw motions cease.

• Spin reversals (changing spin direction) are rare using forward stick for spin recovery. If a reversal should occur, again verify spin direction and apply aileron with the spin.

• The following upright spin recovery should be used only when the aircraft has not been recovered utilizing the poststall gyration recovery procedure and the pilot has positively ascertained that the aircraft is spinning:

(1) Maintain full forward stick.

(2) Aileron – full with spin (turn needle).

(3) Rudder neutral.

(4) Aircraft unloaded and/or yaw rate stopped – ailerons and rudder neutral.

(5) If out of control at 10,000 feet AGL – eject. ◄

Short Snorts

Chance favors the prepared.
Louis Pasteur

Rings Can Ruin . . .

THE MAINTENANCE crew had just completed a calendar check on the UH-2B and was preparing it for a postcheck test flight. The pilot had started the engine and engaged rotors and was waiting for a signal from the helicopter director that the helicopter was OK to launch.

Several crewmembers were checking the helicopter for leaks and one of them, a PR1, was standing on the port aux fuel tank platform. He was asked if he had checked for leaks in the forward section and he replied that he had not. However, without further direction the PR1 completed the inspection in question then turned, stepped down and back off the aux tank. As he did so a ring on his left hand caught on the cargo door latch. His ring flew off and he cried out to another crewman, "I've lost my finger." His wedding ring had caught on the top door latch mechanism. He proceeded to the dispensary and was admitted to surgery where a doctor completed surgical amputation of his left ring finger.

Investigation of the accident disclosed that he knew of the danger of working with a ring on and that normally he removed his ring but in this instance neglected to remove it because he had not considered encountering any hazard. He was relatively inexperienced and unfamiliar with the UH-2B. The irony of the accident is that the cargo door was not fully open and the latch which would have been behind the locking mechanism was prominently displayed – making it highly susceptible to snagging a ring.

One suggestion for *EVERYONE* to consider in order to reduce injuries of this nature is to leave all rings at home before going to work. When you hug/kiss/say goodbye (choose one) in the morning to your friend/bride/battle-axe (choose one) do her a favor *(and yourself);* present her with the rings to keep until you return home.

Stoof Wind Blast

SINCE the birth of aviation, ground crews have braved the wind behind turning propellers while preparing aircraft for flight. There are still a few props around, as *Stoof* drivers will testify, and their plane captains will vouch for the breeze from those big fans. Usually, the director signals "throttles back" before linemen check flight control surfaces but some pilots either disregard the poor guy in the propwash or think it's more important to keep turns on for warm-up of the engine. The VS-35 Safety Officer, curious about how much wind was involved, used a portable anemometer to measure velocity immediately behind an S-2E. At idle (800 rpm) a 22-knot wind was measured, and 1200 rpm (standard for warm-up) increased the wind to "whole gale" proportions of 50 knots plus. That's a lot of wind, as linemen have been saying for years. The ASO considered several ramifications affecting safety and comfort.

From a safety standpoint, footing can be a problem in a "whole gale," especially if the deck is slick from moisture or oil spills. Tests were not run but it is apparent that the FOD hazard to eyes is also significantly greater at 50 knots than at 22. Small bits of FOD such as safety wire and pebbles lifted aloft could cause severe eye injury.

The Navy-developed windchill chart shows the relationship between wind velocity, temperature and rate of cooling for exposed flesh or wind chill factor. This chart was entered for a no wind, mild 50°F San Diego day. Standing in a 50-knot propwash, the plane captain suddenly experiences the same chill as he would in the Arctic on a calm, 26 degree day. That's cold! So,

for safety's sake and as a professional courtesy, give the linecrew a break. Throttle back as far as possible while the linecrew is checking your airplane. You'll probably get a better inspection, too!

Contributed by VS-35

Safety Tip

SEVERAL recent accidents might have been averted if emergency release of external stores had been accomplished. In each case the pilot was involved in an emergency situation with an aircraft configured with external stores but failed to hit the jettison button. Reduced weight and drag can be the difference between a smoking hole and a well-executed emergency.

COMNAVAIRLANT
Weekly Safety Bulletin

Whoa

PILOTS who have a subspecialty in bronco busting are in extremely short supply and the few who have this qualification probably are flying P-3s or C-118s instead of helicopters where they belong. (Detailers, note!)

It was a beautiful July day at Santa Ana – made to order for the COC (Chamber of Commerce). Visibility was more than 25, temperature was 92 (and rising at noon), winds were out of the north at 10, humidity might have been 20 percent (don't really know, just guessing 'cause everything else was nice) and the few clouds which could be seen were "way over there."

About 1030, two maintenance test pilots had been alerted that one of the CH-46Ds would soon be ready for a test hop. The Ops officer (all heart) had suggested that the pilots fly the test hop during the lunch hour. (That day, no one was going to the Pink Puddycat for lunch anyway.) The duration of the flight was .005. As soon as the pilot added enough power to become airborne a violent longitudinal porpoising began. The helicopter bucked far more than any four-legged critter ever could. Sometime between aft rotor high/forward rotor low, and aft rotor low/forward rotor high the aircraft made contact with terra firma and stayed there. The pilots shut down the engines, secured the rotors and without waiting for any applause walked straight to the chapel.

A bolt, PN 107 C 2532-5, was missing from the flight controls! The C.O. recommended that proper inspection procedures by quality control inspectors must be conducted first and that all maintenance test flights demand a particularly thorough preflight by the pilots. Is so!

A 4.0 Save

WHILE descending from 19,000 feet during an instrument approach, the pilot of a T-1A discovered he could not reduce engine RPM below 92 percent. Throttle friction checked free but RPM continued climbing to 96 percent. The throttle was retarded to the idle detent and then advanced to full power; the engine responded with 100 percent. After this the RPM could not be changed regardless of the throttle position. An emergency landing was requested with 1100 pounds of fuel remaining.

Airspeed was reduced in a climb and gear, flaps and hook were lowered. On final approach the throttle was placed in idle cut-off position with no effect. Next the pilot turned off the master fuel shut-off valve and the engine flamed out. During the final approach he completed one successful relight to insure making the runway and secured the engine a second time. Touchdown was made at 105 knots 1000 feet down the runway. The aircraft rolled out and at 5000 feet the pilot turned off without engaging the arresting gear.

It was found that the nut holding the throttle control linkage to the fuel control S-arm had backed off. Each control linkage interface was serrated and as the nut backed off control was lost.

This was one case of an inflight emergency being handled in an outstanding professional manner.

Maintain and Use Flight Equipment Properly

A RECENT accident report contained the following statements:

- The pilot flew at times with one side of his oxygen mask unfastened.

- The possibility exists that noxious fumes from the engine were introduced into the cockpit through the pressurization system. Result: one strike/fatal accident.

A safety survey in another squadron revealed that personal flight gear was in a gross state of disrepair and that most oxygen masks were overdue for cleaning. This equipment allows pilots to survive in a flight environment which is brutally unforgiving of error. Attention to the details of maintenance and use of flight gear is a small price to pay for avoiding the inevitable disaster which results from its neglect.

COMNAVAIRLANT Weekly Safety Bulletin

Monday, Monday

By LT W. J. Mooberry
RVAW-120

IT ALL started normally enough. It was early morning and I was struggling to work, fighting my way through the high speed gauntlet of freeway traffic, oblivious to most everything but the clatter of my beetle's engine and the chatter of the rock-and-roll show on the radio.

No doubt I would never have left the house had I bothered to read my horoscope. Ferment was in the firmament. Mars was nuzzling Virgo (much to the chagrin of Mr. Virgo); while Castor, Pollux and Aquarius were off somewhere cavorting with the Pleiades (those seven sisters always were a little loose with their affections). It was, further, the thirteenth of the month and most disastrous of all . . . a Monday.

"What's the matter, Albert?"

"Bad news, Pogo, Friday the Thirteenth comes on a Monday this month."

Knowing all this, no doubt I would have stayed snugly sequestered in the feathers that day; but I didn't and as I blithely rattled up to Gate Four, received a cursory wave from the sentry and turned towards the hangar, the radio person was babbling merrily along.

"From the early sixties, children, a Golden Oldie from Uncle Jack's stacks of dusty wax!"

"All radio people must be a little weird," I thought as I slowed for the policeman directing traffic on the corner, "talking that way . . . "

The fuzz gave me the come ahead.

"The Mommas and the Poppas' Big Big! Smasherooo, 'Monday, Monday'!"

My ears perked up. John Phillips' music has always been my favorite. And that song, mmmmm . . . great!

Second gear.

"Ba da, ba da da da . . . "

"Monday, Monday

"So good to me . . . "

The song was ending as I pulled into super-big-wheel-reserved-parking-space-number-thirty--four. Humming away, I bounded up the stairs, drew a cup of brew and walked into my tiny cell to do a little paper shuffling prior to briefing for a Fam-3 I was scheduled to give that morning. All the while that song kept playing over and over in the back of my head.

Psychiatrists call that sort of thing a compulsion. A normal enough aberration which all of us have experienced at one time or another. It becomes serious only when it reaches a point where the compulsion becomes the driving factor in our daily lives. Like Lady Macbeth. I mean she tried Lava, Lysol, enzyme pre-soaks and a wire brush . . . nothing would get that old gal's hands clean. Now *that's* a compulsion. But I digress.

By nine o'clock I had generated half a wastebasket full of paperwork and still my incoming box was overflowing.

"What ever happened to the SCRAP program?" I

wondered as I pulled my slightly rancid nomex flight suit from my locker.

Torso harness on and zipped.

Survival vest. Check radio and strobe.

Boots on and tied.

Quickly I ran through my flight gear checklist, picked up my hardhat bag and swaggered down to the briefing room. I don't swagger as a rule but lately my torso harness has been getting a little snug and I have the option of swaggering or experiencing a rather painful sensation when I walk. So I swagger.

Fam-3 is no big problem for a Frisbee driver. A little high work, some trim emergencies, a couple of single-engines at altitude and you eat up the rest of the time in the touch-and-go pattern trying to familiarize the student with landings at various flap settings and single-engine landings. On this day my student was a sharp young JayGee whose performance on previous hops had been well above average. We briefed it all, going over the various maneuvers and emergencies as I outlined just what he might expect on the hop. No sweat.

"Monday morning,

"It was all I hoped it would be."

We checked the yellow sheets and swaggered out to the E-2 we had been assigned.

"Harness a little tight, kid?"

"I beg your pardon, sir?"

"Never mind . . . just talking to myself."

It was a beautiful morning, really; the gentle rains of the night before had scrubbed the air clean and, except for a thin line of towering cumulus barely visible in the east, the sky was a deep blue.

We ran through the trim emergencies during climbout, discussed them and by the time we were at 15,500 feet it was single-engine time.

"Oh, Monday morning, Monday morning couldn't guarantee

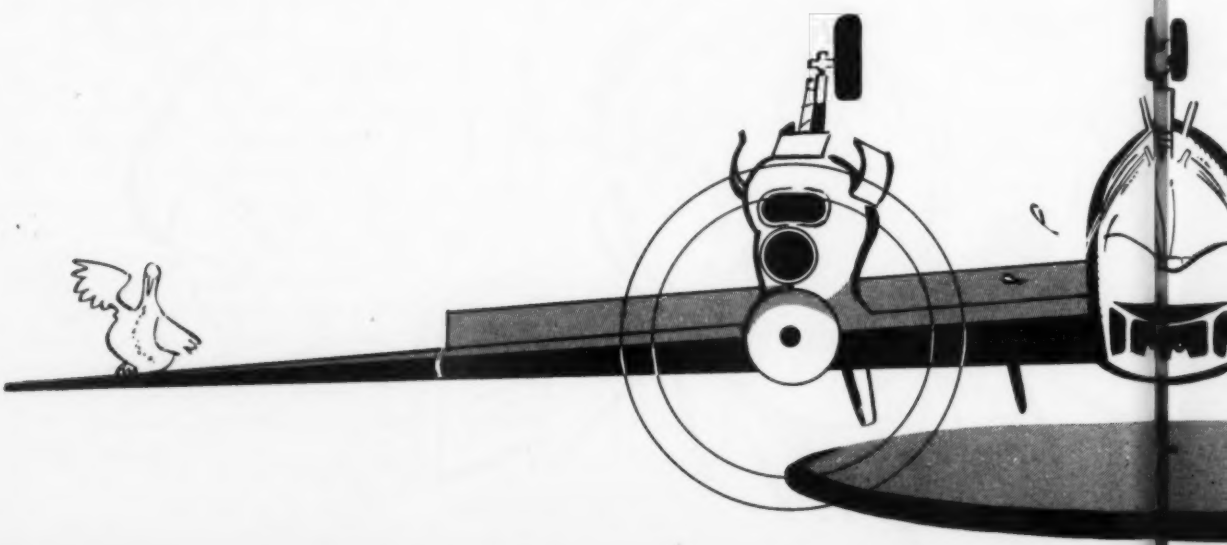
"That Monday evening you would still be here with me."

The student went into slow flight and made a couple of turns just to get the feel of the machine at altitude. When we were straight and level again I pulled the starboard power lever back to flight idle, simulating an engine failure.

Things got wormy fast. He failed to call for the inflight secure checklist, left his gear down, two-blocked the port engine and raised his flaps. My stomach sank; so did the airplane. As we mushed through 14,000 feet I took it, raised the gear, accelerated, turned off the max rudder switch, climbed back up to 15,500, told him what he had done wrong, slowed the aircraft, dropped the flaps and passed control back to him.

"Let's try that again."

"Oh Monday morning



"You gave me no warning
"Of what was to be . . . "
Down came the gear.
Blap! Starboard engine out. (Gotcha)
Two-block! Went the port engine.
Again . . . no checklist.
"Oh boy, I may be up here all day."

This time, however, forgetting the checklist caused even greater problems. Without the max rudder switch on (allowing an extra 14 degrees of rudder throw) the aircraft went into a severe swerve to the right. Standing on the left rudder (as he was) with the starboard engine at flight idle is of little help and we were losing altitude fast.

To stop the altitude loss and to give himself more leverage on the pedal, he was pulling back on the yoke and we got slower and slower and more and more out of balanced flight.

"Enough's enough," I thought.

"What's wrong?" I asked.

"I don't know."

(You in a *heap* 'a trouble, boy.)

I was about to mention that turning the max rudder switch on and simulating feather on the starboard engine would probably help a lot when suddenly and without warning (to recoin a well worn clich'e) there I was flat on my back at 15,000 feet! A classic skidded turn stall.

No rudder shaker. No prestall buffet. Nothing. Just suddenly that big, 49,000-pound airplane (which isn't supposed to do that sort of thing *clean* let alone with gear and flaps down) flipped upsidedown and I, both surprised and amazed, found myself gazing down on the farms below through the overhead hatch.

Reveille!

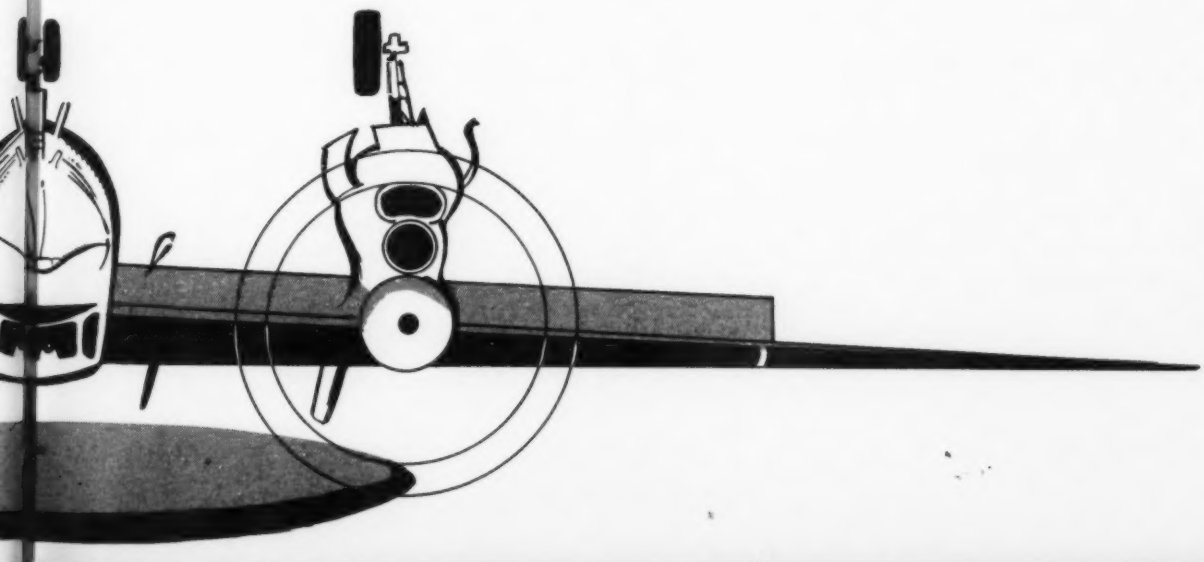
It was at this moment that I uttered a classic exclamation which doubtless will be recorded by historians alongside, "One small step . . . " and "I have returned." for it's poetic simplicity. Mustering all my mental faculties I grabbed the yoke, sang in a sort of falsetto soprano, "Crimenettey, I've got it."

And closed the throttle on the port engine so as not to overstress anything and to return us to balanced flight.

It was truly a miracle I was able to speak at all as my heart, having gone to GQ, was lodged tightly behind that little dingly-dangly thing in my throat and was pumping one-hundred proof adrenalin allll-ooverrr my bodddy.

It took exactly three microseconds* for me to apply every spin correction I'd ever heard of to that airplane. As the roll continued I tried to fly it out with ailerons and rudders as we passed through the wings level

*A microsecond is the smallest measurement of time known to mankind and has been defined as that span between the time a traffic light turns green and the lady behind you starts honking her horn.



position. No joy. Over again. Hands and feet working like mad. The one-armed paperhanger and the one-legged man all rolled into one. Trying everything. Nothing worked. Mentally picturing myself crawling back through the passageway trying to bail out as we spiraled down. Finally, I neutralized the controls, said a quick prayer and held on tight. Waiting. Not wanting to die.

It stopped! We had stabilized in a nose-down attitude.

Easy now.

Gear up.

Flaps up.

Power on – both engines.

Raise the nose . . . easy.

"We made it. We're OK."

"Monday, Monday

"Can't Trust that Day."

Carefully, I turned for home and checked in the overhead mirror to see if we were missing anything serious like the dome or a piece of rudder. Convinced everything was still intact, I made an uneventful right seat landing, taxied in and shut it down back in the line. After kissing the ground affectionately, I bowed three times in the direction of the Hampton Roads Bridge-Tunnel, arose, wiped the grease from my forehead, waddled into material control, got a survey chit for my flight suit, bummed nine cigarettes from the chief and smoked them all at once.

It was close, believe me. I still get the willies when I think of 16 million dollars worth of scrap aluminum and transistors all rolled up in a ball at the bottom of a smokey hole in some bean field. Nobody wants to get it on a Fam-3. Personally, I plan to go at the age of 96 at the hands of a jealous Ensign.

So let me say this about that:

In an instructional situation one must allow the student to make mistakes because trial and error is the name of the game. Conversely, screaming and jumping on the controls each time the student dips a wing is a sure sign you're in the wrong business. The difficulty arises in attempting to determine just how far you will allow him to stray before you grab the reins, pull him up short and say, "Whoa, Snerdly, one more (degree, unit, knot) and you're gonna kill us both."

Sometimes you get lucky, like me. You let him go too far and live to tell about it. Sometimes not.

So, in order to stay lucky (read: *alive*), I have evolved the following set of rules to insure that my logbook will continue to reflect an equal number of safe takeoffs and landings:

1. *Be vigilant*. An instructor cannot afford to relax for a moment.

Sunbathing and sightseeing are great pastimes but *not* to be engaged in while airborne.

2. *Be prepared*. I've yet to meet a student who would admit he can't hack it. He'll keep struggling with the aircraft until it falls out of the sky if you let him.

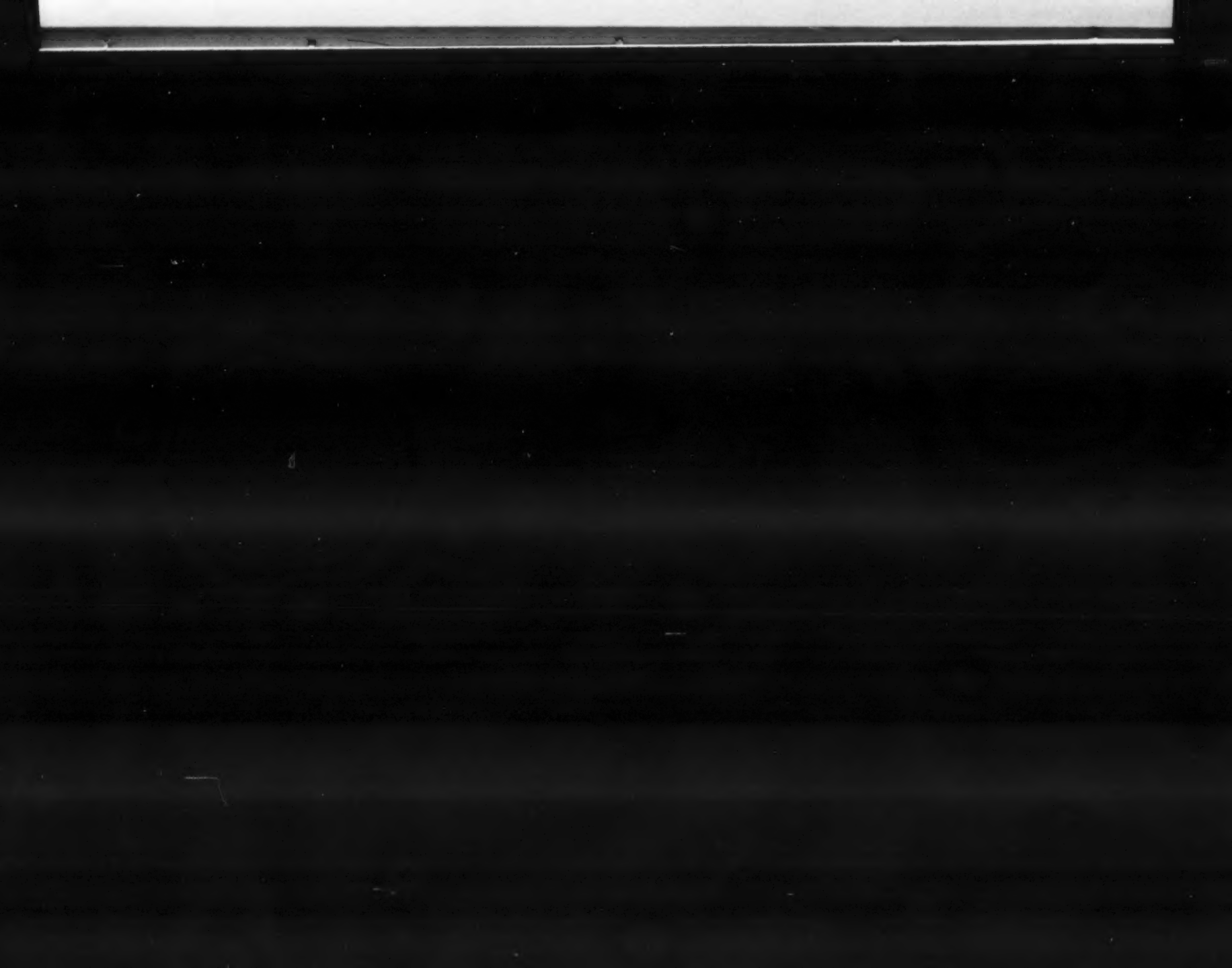
3. *Be firm*. Like the farmer's mule, getting a student's attention is at times difficult. Luckily, all Grumman aircraft come equipped with a hydraulic pump handle which, when applied smartly to the starboard visor button of the student's hardhat, will often break his fixation on the deicing suction gage and get him flying the aircraft again. Should your aircraft lack a pump handle, I've found sticking the pink end of a pencil in his eye will produce equally admirable results.

4. *Communicate*. Don't do things for the student without telling him about it. Indeed, had I not innocently turned off the max rudder switch that day (confirming my reputation as a nice guy) and then *neglected* to tell him about it (confirming my reputation as a dummy), I doubt the incident ever would have happened.

5. Finally, *Read the skies*. There are signs given us by the stars which we completely fail to understand. If your horoscope looks bad for a given day, be extra alert for catastrophic situations and plan ahead to avoid them. And music. Yes, music too is prophetic. Listen to it and heed its message. Like this morning, as I came through the gate, the radio nut was playing a delightful little ditty called, *"Suicide is Painless."* I turned it off. ◄

Those who dare to teach or lead must never cease to learn.

Industrial Supervisor



Memorandum

LAST MONTH I asked my staff to come up with some predictions concerning aviation safety for FY 71. Although the past is far from a perfect guide for the future, it's the only one we've got; and a review of the records both locally and throughout naval aviation has shown us that certain mishaps can be anticipated.

During the last three years, the Naval Safety Center recorded engine-caused accident rates of .22, .17 and .29 for the A-4 and .44, .89 and .49 for the UH-1. During the same period, we in 3d MAW recorded two engine-caused A-4 accidents and three engine-caused UH-1 accidents. Based on these records, we can anticipate that a J-52 engine failure will cost us an airplane this year, and that a T-53 engine failure will cost us a helicopter. These losses could occur not because J-52 and T-53 engines are significantly less reliable than other engines but because they happen to power our two single-engine aircraft – the A-4/TA-4 and the UH-1.

During the last three years, the Safety Center recorded fire-in-flight rates of .45, .36 and .28 for the F-4 and we in 3d MAW lost two F-4s to this cause. Again, fire-in-flight could cost us an F-4 this year – probably due to failure of a bleed air duct.

It can be argued that these accidents should be "charged" not to us operators but to the contractors who built the machines, NAVAIRSYSCOM who bought them, or the NARF which overhauled them; and indeed I have directed that official correspondence be prepared recommending that accountability for aircraft accidents be aligned with primary cause factor rather than physical custody. But, when we are personally dealing with one of these historically predictable failures, our first concern is not accountability but survival – primarily our own, secondarily that of the machine. And what we should be interested in now is: What can be done about it before the fact?

There's quite a lot that can be done before the fact. It all comes under the general heading of NDT – non-destructive testing. Examples of NDT are:

- SOAP – the Spectrometric Oil Analysis Program: a blood-test for engines, transmissions and CSDs.
- VBL – Vibration Base-Line: an electrocardiogram for engines and gearboxes.
- USI – Ultrasonic Inspection, which supplements X-ray inspection.
- Hydrostatic Testing, which has already saved us several F-4s.

All of these are available either within the Wing or through NAVAIRSYSCOMREPPAC, contractor representatives, etc. Used in conjunction with organizational maintenance level trend analysis, NDT enables us not only to predict that a failure will occur but also in many cases to predict how and when.

A failure which could have been detected on the ground before the fact but which instead is detected in the air after the fact is not just a material failure. It is also a maintenance failure – and *we* are accountable.

Commanding General
Third Marine Air Wing

Inadvertent Engine Shutdown

MY FLIGHT leader and I briefed for a two plane tactics hop. The flight leader would be flying an A-4F *Skyhawk* and I had an A-7 *Corsair*. Briefing, preflight, start and takeoff were all normal and we proceeded to our assigned acrobatic area. The flight leader requested clearance into the area and it was granted, using a base altitude of 5000 feet. We then commenced the tactics portion of the hop with the leader rolling in from an altitude advantage of about 3000 feet. I was level at 15,000 feet.

During the fourth engagement I maneuvered my aircraft into what I considered to be an advantageous point, closing in on the leader from his eight o'clock position, slightly low. I began to overshoot and then started a yo-yo after passing his six o'clock position. At this time, the throttle was full forward with the throttle friction full on. I tried to retard the throttle during the yo-yo but couldn't because of the throttle friction. Without looking I reached for what I thought was the friction lever and pulled it all the way back, then grabbed the throttle but it still would not retard. At this time the engine became silent and began to unwind and I realized that I had turned off the fuel master switch. I then pushed the fuel master switch back ON, retarded the friction, reduced throttle to idle, extended the emergency power pack, switched to manual fuel and commenced an airstart.

Estimated altitude at flameout was about 14,000 feet. I moved the throttle to the ignite position, pushed it forward and nothing happened. I then noticed that my airspeed was 180 knots. Next, I pushed the nose forward and picked up over 220 knots. I hit the igniters, moved the throttle forward and again nothing happened. I again retarded the throttle passing 5000 feet, airspeed greater than 220 knots, hit the igniters and I could hear the engine light off. RPM, fuel flow and TIT indications were increasing and the airstart was a success.

I leveled off at 3000 feet, checked the engine instruments and said a prayer of thanks. I then retarded the throttle to 80 percent and switched back to primary since the engine instruments were normal. I climbed to rendezvous altitude and joined on the leader.

Looking back, here are some comments on the flight:

- The flight had been briefed for a counter, a recounter and then to break it off.
- Radio contact was tried after the engine was accidentally shutdown but to no avail (I had pulled the helmet connection from my mask during the initial shutdown).
- Although the NATOPS emergency procedures (pilots checklist) does not restrict switching back to primary it might be to the pilot's advantage to stay in manual fuel control after a relight. Since I knew the cause of the flameout, I elected to shift back to primary fuel.
- The flight leader was not

The purpose of Anymouse (anonymous) Reports is to help prevent or overcome dangerous situations. They are submitted by Naval and Marine Corps aviation personnel who have had hazardous or unsafe aviation experiences. These reports need not be signed. Self-mailing forms for writing Anymouse Reports are available in readyrooms and line shacks. All reports are considered for appropriate action.

REPORT AN INCIDENT, PREVENT AN ACCIDENT

informed of the shutdown, and thus the two tigers went at it again.

ACM Mouse

The way we see it, this is an excellent testimonial for the need to know your aircraft. For corroborating evidence, read the article entitled "Don't touch that handle!" on page 31 of the April 1970 APPROACH. In addition, a flameout in flight (accidental or otherwise) in a single-engine aircraft is reason enough to terminate the flight ASAP. For this reason we believe that once the relight was obtained, the flight leader should have been notified at once and the flight terminated at the nearest suitable field. Then, the possible causes for the flameout (and possible damage on relight) could have been considered at greater leisure (and with greater safety).

Guinea Pig

DURING some problem times with squadron aircraft it became necessary to make many new and exotic tests (?) airborne. On one test flight, as test pilot, I was asked to make a test with gear and flaps down and speedbrakes out. The test was to set up an idle descent at *optimum* angle-of-attack in this configuration and at 1000 feet MSL note the idle RPM and then snap accelerate to military power. This did seem a bit unusual but in the interest of (?) I went ahead.

Preflight, start, takeoff and the first portion of the flight was normal. To make sure of enough room to recover I entered the above configuration at about 3000 feet MSL and established my sink rate. A check showed that an acceleration time of 15 seconds would require 500 feet. Not bad? Except terrain clearance would only be about 150 feet. But I pressed on – all in the interest of (?).

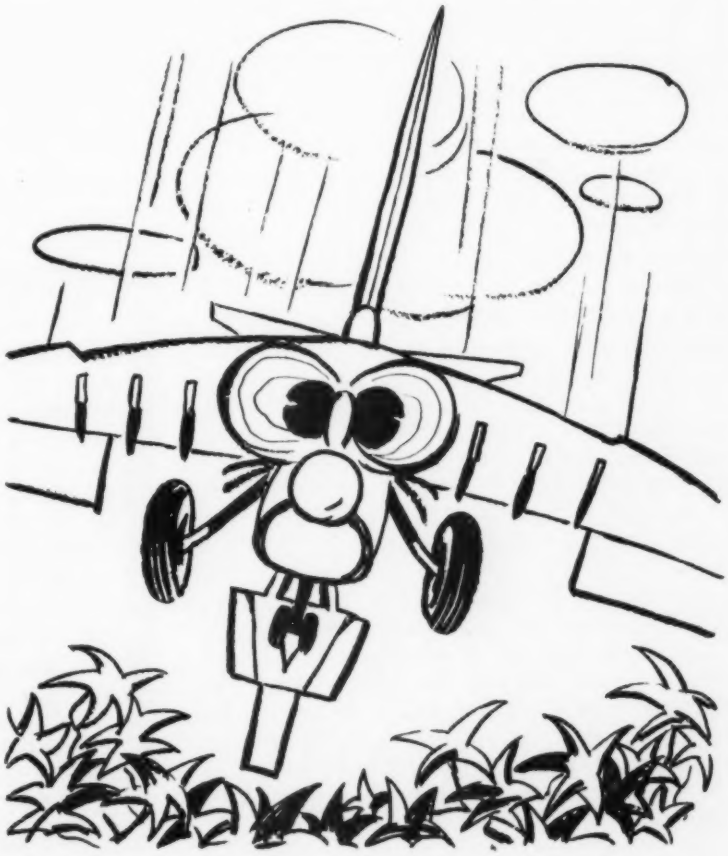
After going to 100 percent, bringing the speedbrakes in and starting the gear up I did clear the trees by about 150 feet. A little falter and we might have lost a bird. For what? All in the interest of determining if the plane can be recovered from the 180 degree position in the event of inadvertently pulling the power control lever to idle. Just because someone asks you to do something stupid doesn't mean you have to make it unanimous!

Test Mouse

Your story has given our imaginations quite a workout. Even so, we are still at a loss as to what situation could exist in your squadron which would justify – or even suggest – the requirement for such "tests."

You don't say what the elevation of the terrain was but even if it is sea level, the altitude you mentioned for this test is too low to provide any margin for error. You don't say what type aircraft was involved either, but you do indicate that it takes 15 seconds to accelerate from idle to full power. However, the possibility of drawing an aircraft which does not meet designed acceleration time limits is too real to justify the test which you describe.

If a bona fide need exists for such tests we believe they should be undertaken by a designated test facility with designated test pilots, operating under all available safeguards – not by an operating squadron on a hit-or-miss basis. ◄



It could be any time of day or night or any kind of weather; on the flight deck of a carrier, during FCLP, or on the runway of an airfield; wherever or whatever, whenever his services are required you'll find an LSO expertly guiding naval aviators to successful carrier approaches and landings. Sometimes, however, things get fouled up because there is a breakdown in communications. The incident described below is one such occurrence.

Hit the Deck!

ANY carrier pilot worth his salt will admit, even though it may be in whispered tones, that at one time or another he's given Paddles the fits. Over the years our stalwart LSOs have occasionally been forced to hit the deck to keep from getting shortened by errant aircraft. The number of times is not a matter of record but chances are the total, if known, would be impressive. Just such an incident occurred and is presented as an example of how both a pilot and the LSO can lose sight of the proceedings when the environment is altered. Night FCLP (Field Carrier Landing Practice) was in progress at NAS Western with a group of A-3s in the pattern. The first three series of passes were made using the runway centerline for lineup. Prior to commencing the fourth pass the LSO had portable battery-powered lights placed on the left-half side of the runway to simulate carrier deck lighting. He then made the following transmission to the pilots in the pattern: "All FCLP aircraft (garble) now line it up on the left-hand center half (garble) three red lights out there you might get to see them."

The pilot of the first A-3 in the pattern commenced his fourth approach and all went well until the aircraft entered the groove. At that time the pilot and crewman/navigator (copilot) saw only the left-hand row of simulated carrier boundary lights. Believing these lights to be the centerline the pilot used them for lineup during the remainder of the approach. As the aircraft crossed the ramp the LSO transmitted two "Line it up" calls in rapid succession and then ducked down in the LSO cart fully expecting to become a part of the port wing. Fortunately the wing missed him and the aircraft continued down the runway. Due to the excessive left lineup the port wing struck the lens cut lights, causing an estimated 112 man-hours of damage to the underside of the wing. At no time was a waveoff called for by the LSO.

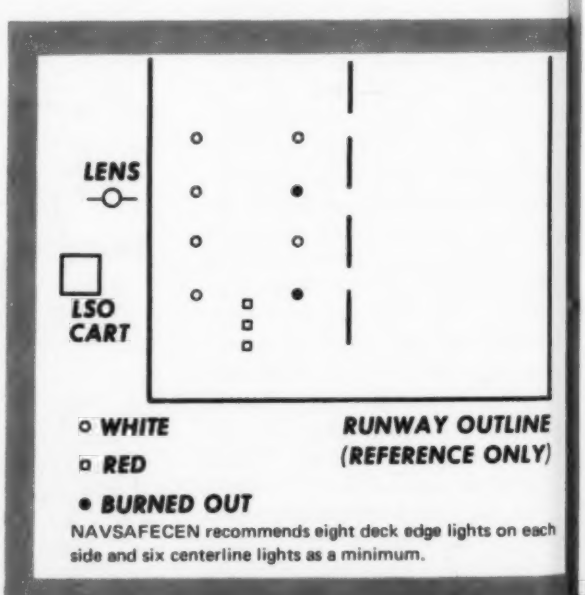
In conducting an investigation of the incident the ASO (Aviation Safety Officer) discovered that two of the four lights constituting the right-hand simulated carrier boundary lighting were inoperable. He also found that the red centerline lights were not visible to the pilot or copilot at anytime during the approach. The ASO opined that the causes of this incident were:

Inadequate simulated carrier deck lighting in use on the FCLP runway.

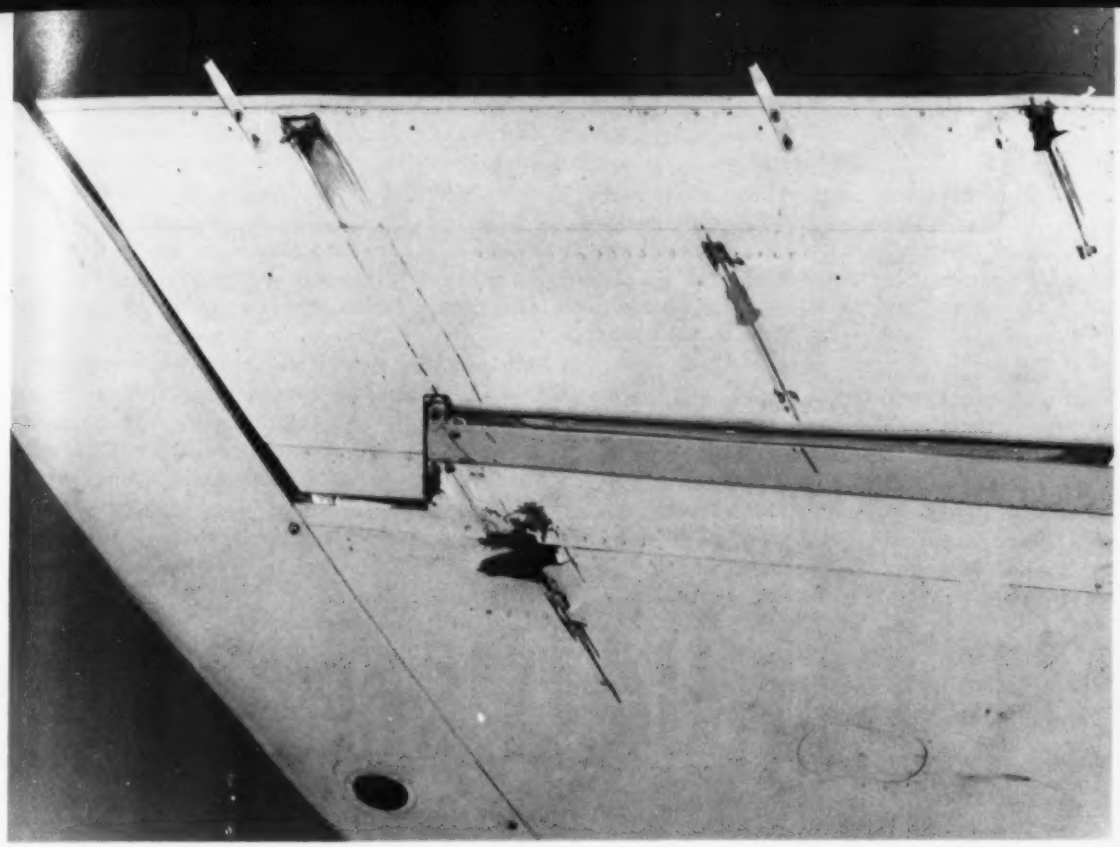
The LSO's failure to wave off the aircraft when pilot response to correction calls was negative.

The pilot's failure to recognize the lights he used for lineup as the left boundary vice the centerline of the simulated carrier deck.

In his endorsement to this aircraft incident report the



NAVSAFECEN recommends eight deck edge lights on each side and six centerline lights as a minimum.



Fortunately, this was all the damage, but . . .

C.O. stated: "An increased number of portable white lights are being obtained in order to provide an adequate simulated night carrier deck. A standardized simulated carrier deck lighting configuration will be used in the future. This lighting configuration will be briefed to all crews prior to commencing FCLP operations."

Here's an aircraft incident that missed being an aircraft accident by the length of a gnat's eyelash. It could very well have ended with the loss of an aircraft and a call for *"Tilly"* and pallbearers. Except for an actual night carrier landing there is no type of landing evolution which requires more skill and precision on the part of a pilot than a night FCLP. Therefore it is imperative that equipment used to simulate a carrier deck be as authentic as possible.

A breakdown in communications between an LSO and a pilot in the landing pattern can sometimes lead to a tragic mishap. In this incident the pilot was told to line it up twice by the LSO as the aircraft crossed the ramp but failed to take corrective action because he thought he was lined up. On the other hand, the LSO waited too long to take positive action and wave the aircraft off and ultimately was forced to duck in order to avoid being struck by the port wing. Furthermore, neither the pilot involved in the mishap nor any of the other A-3 drivers in the FCLP pattern querried the LSO concerning his garbled transmission about the change of simulated lighting. It is mighty fortunate that a more serious mishap didn't occur.

Throughout the years of naval aviation LSOs have consistently practiced their profession in an outstanding manner. They are highly respected by their fellow naval aviators and rightfully so. However, being human like the rest of us, they too have moments of forgetfulness brought about by impending danger. The only way to prevent incidents such as the one described herein is for LSOs to ensure that pilots involved in carrier landing practice (or carrier landings) are fully cognizant of what is expected of them. To do this they must conduct thorough briefings prior to flight operations and then use the UHF radio to its best advantage during flight operations. When deviations from prebriefed procedures are called for by the LSO he must receive acknowledgement from each pilot in the pattern that he fully understands the new instructions. Finally, when it's obvious that a pilot is having trouble the LSO must take positive remedial action soon enought to prevent a more serious situation from developing. ◄

The Naval Safety Center

cordially invites

All Helicopter Pilots

to

A Review

of

A Basic Helicopter Technique

94 Percent Nr

By LCDR Donald A. Mohr

In a short period of several months six CH-46 helicopters have been lost because of low RPM and two others received major damage for the same reason.

ASK any H-46 pilot what 94 percent Nr (rotor RPM) means to him and you will probably detect a sly smile creep across the face of this hardened veteran. Although the question does not require an Article 31 warning it is tantamount to asking the individual if he has read the Navy's latest best seller – NATOPS. Chances are, if your suspect has done his share of homework, you will get an answer to this effect, "94 percent Nr is the most efficient rotor speed."

Now wait! While this answer is adequate and your friend can move to the head of the class, his answer requires some qualification. A careful survey of the CH-46 NATOPS flight manual will reveal the fact that there are no procedures outlined to permit operations at 94 percent under any dual engine conditions. However, when a pilot is faced with an emergency situation of a single-engine, rotor speed *may* be reduced to 94 percent absolute minimum. The rationale behind using this lower RPM must be appreciated as this is an in-extremis situation where just a little extra lift might save the aircraft and crew. It should also be noted that a secondary requirement is a 15-degree right yaw and 65 to 70 knots airspeed when using this single-engine technique.

Lately some misinformation has been heard to the effect that "as rotor RPM decreases from 100 to 94 percent the torque on both engines will increase six percent." This reaction has obviously led a few pilots to believe that more work is being accomplished at the lower, more efficient rotor RPM. Don't you believe it! The higher torque is only a function of a greater output being demanded of the engines as the rotor turns decay.

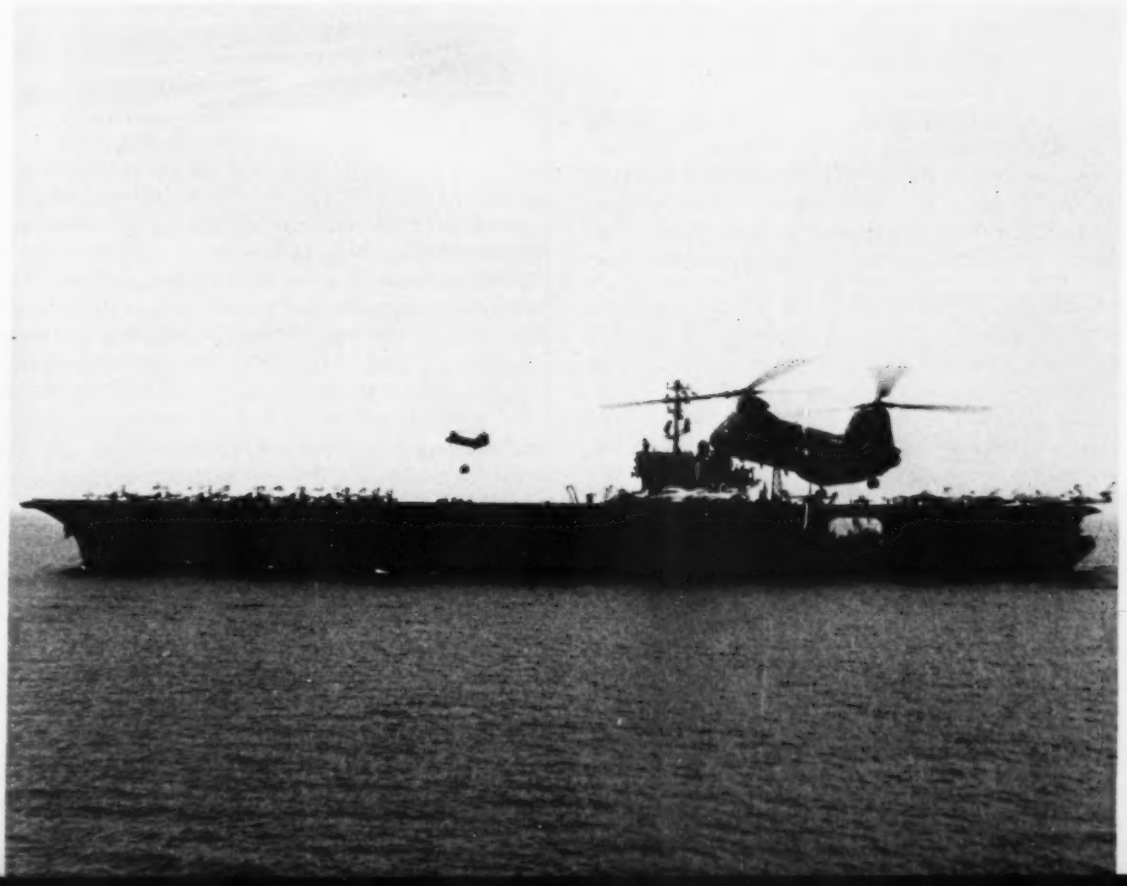
Before you consider the merit in this theory and rush out to conduct your own research and development program, let's look over the facts. Unless you're the type who really works best under maximum stress and doesn't believe in having any safety margin, don't get down to 94 percent. *Little if anything can be gained from operations in this range.* General Electric T-58 engines are designed and tested to deliver full power (topping) at 100 percent Nr. Further application of up collective can not improve the output of the engines,

since topping, once achieved, will remain constant as rotor RPM decay. If one is foolish enough to overlook some basic helicopter theory and sacrifice the very same RPM needed to fly and control the helicopter, what then?

- You are coasting down the backside of the power curve. The only tradeoff is altitude (by lowering the collective). In a hover you can't afford to lose much altitude.
- If you somehow get into a hover with low RPM, it is most unlikely that you will have additional power for transition into forward flight.
- If you're underway aboard ship, remember you are probably already in translational lift.
- The vibration absorbers are tuned in the 99-101 percent Nr range. Operations below this will cause higher levels to be transmitted in the cockpit.
- The controls are not as responsive. More displacement will be required for minor corrections in aircraft attitude.
- At 88 percent Nr, (Yes, some pilots have really gotten down this low and lower.) you will lose your generators which supply power to the SAS (Stability Augmentation System) and ATS (Automatic Trim System). Can you imagine flying at 80 percent Nr without stabilization? No pilot if he really took stock of the situation would intentionally operate in this area – there is just too much to lose.

Sometimes pilots may be fooled into thinking that a payload is within their capability. Don't think just because another aircraft can pick up a given load that you can, too. Don't assume that if you lifted a similar load a day ago you can do it now under different ambient conditions or in a different helicopter. Make your triple tachometer your Go/No-Go indicator. If you can't hover or pick up a load at 100 percent Nr with less

rand Below Is a No-No



than topping power (Ng/T5) you have no reserve power margin. Remember, you will need about one-half percent Ng (gas turbine speed) to move into translational lift and never forget that rotor RPM is all that makes "those magnificient men in their flying machines" do their thing.

One way to make sure that you do get the most out of your aircraft is to verify full power *prior* to conducting any heavy lift. Why not get this out of the way as you fly to the zone? Check that on your GE T-58-8B engine you reach T5 of 677 degrees and/or Ng of 100.3 percent if you are at temperatures above 75°F (24°C). For temperatures below 75°F sometimes it will be necessary to go to altitude to ensure the engine is not fuel-flow limited – where neither topping Ng nor T5 will be seen. The GE T-58-10 engine in the CH-46D will always deliver 100.5 to 101 percent Ng when operating at temperatures above 54°F (12°C) at sea level. There is no minimum T5 at topping. So, remember that if you top at less than 696 degrees T5 when you secure PMS (Power Management System) you will not get the usual horsepower increase in engine performance. (See Fig. 1 below.)

At 59° F there is a gain of 25 hp with PMS OFF
At 90° F there is a gain of 80 hp with PMS OFF

Fig. 1

If you ever have cause to doubt your aircraft instrumentation, schedule the engine for a date with an H-219 Engine Trim Tester, and get it precisely adjusted. Keep your RPM at 100 percent and you'll find that you can avoid that "let down feeling" and also the opportunity to chat with all those interesting people like the C.O. and ASO under less than ideal conditions. ◄

Inflight Emergencies

AVIATION history is replete with astounding aeronautical feats of pilot skills being responsible for coping successfully with all kinds of emergencies. Naval aviation has been a generous contributor to these bits of lore and it seems that in the past decade or two, perhaps because of the basic design of helicopters, a great number of "saves" have been of the rotary-wing variety.

Any pilot who tools around in rotary-wing aircraft for a living sooner or later is going to have the opportunity to demonstrate, when the chips are down, whether or not his time, training and experience has been well spent. As most know, a helicopter is a mass of push/pull rods, bicycle chains, gearboxes, screwjacks, linkages, servos, reduction gears and other items which generally work smoothly, occasionally hang up and once in a while, go "snap, crackle and pop." Whenever the aforementioned mechanical "whatchamacallits" bind, the pilot has to get off his duff – quickly – if the aircraft is going to be landed without damage to the airframe or injury to crew and passengers.

Some Examples

A Marine First Lieutenant was airborne on a postmaintenance flight in a UH-1 when he felt several severe shudders in the rudder pedals. Suspecting the worst, he commenced a precautionary approach to an open field. At approximately 30 feet AGL he lost all rudder control and entered a full autorotation the rest of the way to a safe landing. A cotter pin had sheared allowing a nut to back off the jack shaft on the 90-degree gearbox. This caused a loss of pitch control on the tail rotor. His correct diagnosis of the problem in the early stages followed by flawless execution of a full autorotation prevented an accident.

A Navy pilot was cleared to launch in his SH-3 one night from the ship. He lifted into a hover at which time the helicopter banked 30 degrees to the left and then rolled 30 degrees to the right. He neutralized the cyclic and the oscillations decreased to about 15 degrees. Timing the banks perfectly he waited for a momentary wings-level attitude and landed the aircraft, disengaged and shut down without further difficulty. Inspection revealed a broken electrical connection in the "B" channel roll section of the dual channel lag amplifier. Securing the ASE (automatic stabilization equipment) would have alleviated the malfunction but time precluded this. His experience and pilot skill prevented a major accident and possible fatalities to the aircraft crew and deck crew.

While taxiing an SH-3 across runway 9-27 at a naval air station a Navy Lieutenant preparing for a test flight suddenly became airborne and experienced a forward tuck-under followed by an uncontrollable right rotation. After numerous 360-degree turns and strange attitude changes he landed safely. It was determined that a wind of about 20 knots from his six o'clock position had caused him to become airborne and tuck under almost simultaneously. The loss of left rudder authority was caused by improper adjustment of the negative yaw force gradient assembly. His experience and skill were responsible for another save.

The pilot of a *Sea Knight* flying lead in a four-plane formation at 1500 feet, 100 kias experienced an abrupt movement in the controls as his helicopter went into many strange gyrations. It yawed left 45 degrees, began a left slow roll and pitched up erratically. He turned off the ATS (Auto Trim System), which didn't help matters. He was able to regain some control and return to straight and level flight. Both stick and rudder feedbacks continued. He selected No. 1 SAS (Stability Augmentation System) and the feedbacks stopped. When No. 2 SAS was reselected the feedbacks returned. He secured No. 2 SAS and turned the ATS back ON. Fortunately he wasn't too far from the ship and called for an immediate landing and was cleared straight in to spot No. 7. After a safe landing, postflight inspection revealed the feedbacks had been caused by air in the No. 2 control boost system.

A Marine helo pilot was utilizing his CH-53 in a Tactical Aircraft Recovery flight to haul a CH-46 when his No. 2 engine began chattering, emitted a loud bang and unwound. He secured the engine just as his crew chief reported it was on fire. The engine was motored until the fire went out. The pilot then attempted an airstart but the fire returned so he again put the fire out by motoring the engine. By judicious use of power on his good engine he was able to safely deliver the external helicopter and then land his own aircraft without further complications. Postflight inspection revealed that the No. 2 engine had a seized gas generator and a seized power turbine – no apparent FOD.

Things in Common

In each example given, the pilot involved proved he knew his bird and his procedures, and when faced with a this-is-no-drill emergency he successfully terminated the hairy situation without any damage to the aircraft or any injuries to personnel. In any emergency, real or simulated, there are basically three steps which must be taken in sequence to cope with the problem; namely, *recognition, determination* of actions to be taken and *execution* of proper procedures.

The first is easy (no thought). Even a pilot half asleep (egad!) quickly recognizes the onset of trouble with severe control kicks, rudder shudders, unusual rolls or pitches and engines unwinding. (Gadzooks, man, the beast speaketh to me.) The second step is harder (thinking required). Since the senses have been stimulated in some manner, the computer has been energized. Quickly the circuit on emergency procedures pops into the mind and from the symptoms available plus immediate total recall from ground school lectures, NAMO trainer, NATOPS and experience, information is sorted out to decide what must be done. (Do something! Don't just sit there!) Lazily mulling over alternate courses of action, between one and two seconds, the toughest part arrives – implementation. The red bordered pages of the NATOPS Manual illuminate in the mind's eye and it's a "piece of cake" as the pilot rapidly and correctly executes the one-two-three called for.

Kudos to these pilots for their saves and to the many others of you who have been there too.

Windchill Chart

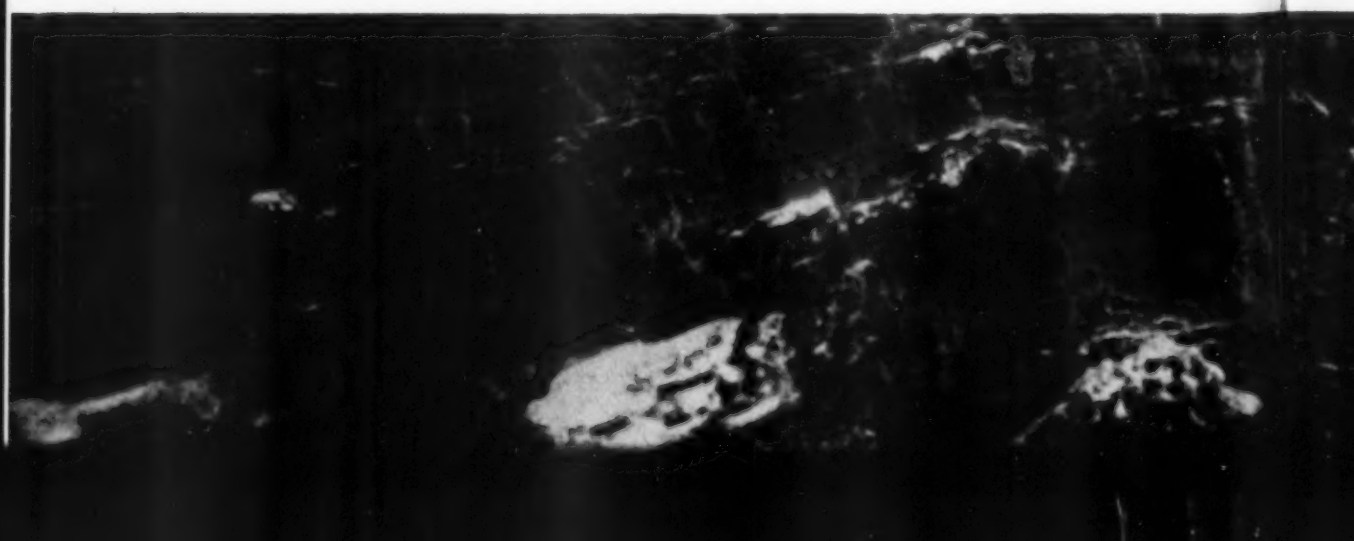
SOME THINGS bear repeating – fasten your helmet chinstrap, fly with your visor down, watch where you're going. A couple of years have gone by since we printed the Navy's windchill chart so it's about time we had another go at it. The source is TB Med 81 (NAVMED P5052-29) of 30 Mar 70 and it's the same chart that's used by the Army and the Air Force. Remember the chart is of value only in predicting frostbite to exposed flesh.

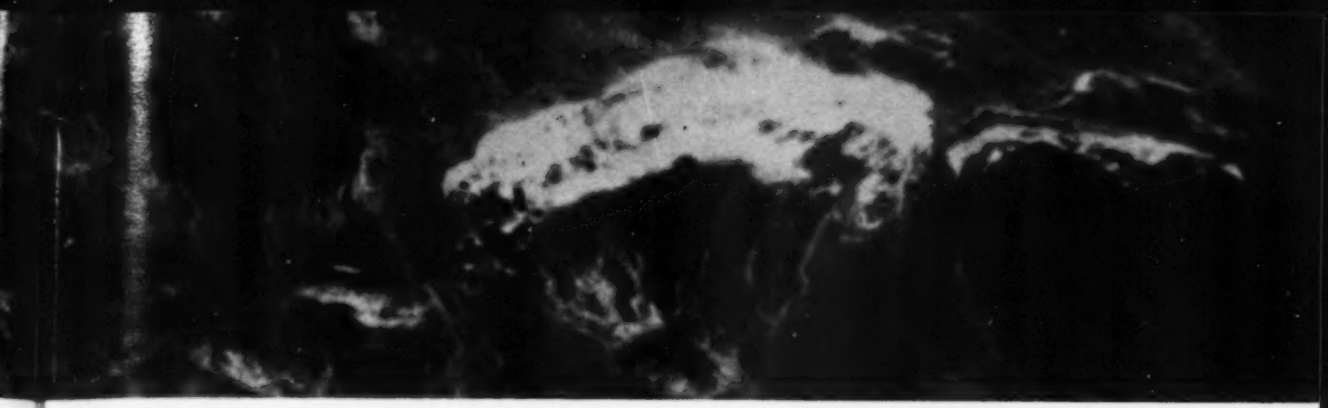
Your body is continually producing and losing heat. Wind increases heat loss by reducing the thin layer of warm air next to your skin. This heat loss increases as wind speed increases. When air temperature is below freezing and the wind takes away heat faster than your body can replace it, you get frostbite. The danger of frostbite to exposed skin increases as the air temperature goes down or the wind speed goes up. The combined effect of wind and temperature is expressed in the wind chill chart as an equivalent temperature. This expresses the effective temperature acting upon exposed flesh.

Any movement of air past your body – such as that produced by walking, running, skiing or riding in an open vehicle – has the same cooling effect as wind. You should consider this in addition to natural wind when you use the windchill chart.

Any clothing or material which reduces or stops the effect of wind will give protection to the area covered but don't try to estimate this protection when you use the windchill chart. Incidentally, wet clothing or footgear has a much reduced insulating value and will result in body heat loss nearly equal to that of exposed flesh.

Here's how you use the chart: find the estimated or actual wind speed in the left-hand column and the actual temperature in degrees F. across the top. Come across and down. The intersection on the chart is the equivalent temperature - the effective temperature acting upon exposed flesh. Precautions should be taken accordingly.





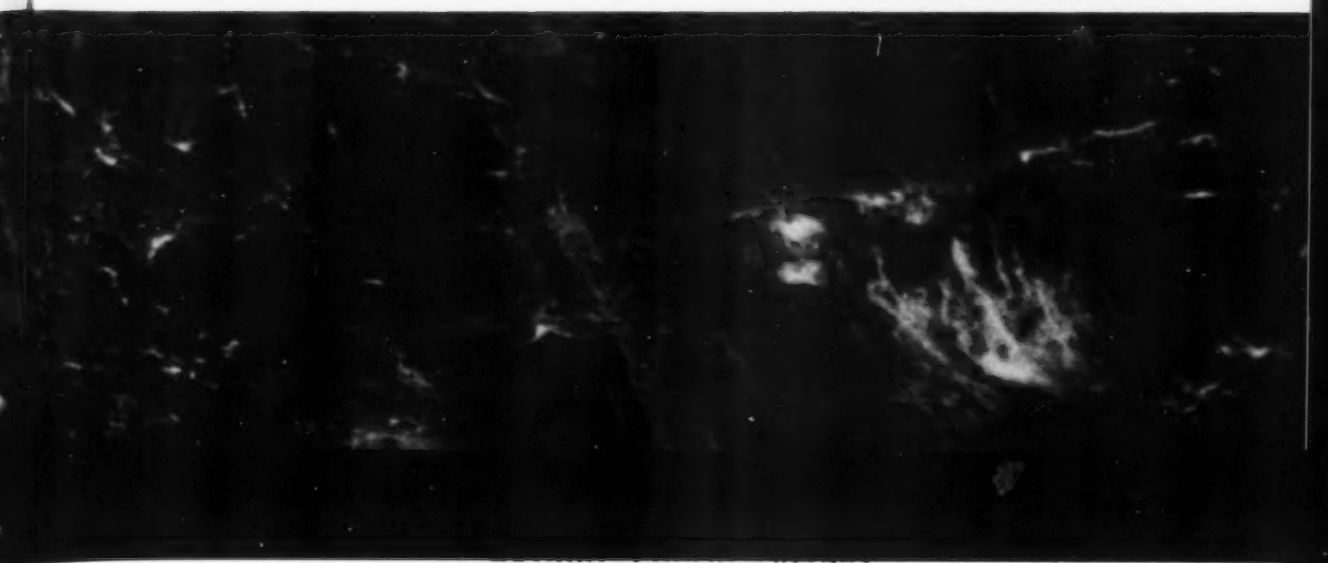
Cooling Power of Wind on Exposed Flesh Expressed as an Equivalent Temperature
(under calm conditions)

Estimated wind speed (in mph)	Actual Thermometer reading (°F.)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	EQUIVALENT TEMPERATURE (°F.)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-124
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148

Wind speeds greater than 40 mph have little added effect.	LITTLE DANGER (for properly clothed person) Maximum danger of false sense of security.	INCREASING DANGER Danger from freezing of exposed flesh.	GREAT DANGER

Trenchfoot and immersion foot may occur at any point on this chart.

Source: NAVMED Bulletin 5052-29



Nick Natops

'Twas the night before Christmas, and nowhere around
Could that jolly old flyboy St. Nicholas be found.

By 2100 control was asweat
Of St. Nick not so much as a whisker seen yet.

They called on the Air Force, who rechecked their radar,
And transmitted "Negative, no contact so far."

They sent interceptors to scour the skies,
But all that came back were disheart'ning replies.

They put out a call to Deep Freeze Operation,
Had orders been sent for St. Nick's change of station?

They radioed people from Iceland to Nome,
Had anyone sighted our aerial gnome?

But all of their queries were answered with "Nix!"
By 0200 – "A hell of a fix!"

"There'll be millions of children devoid of good cheer,
If Santa Claus doesn't deliver this year."

So they thought and they thought for some alternate way
To satisfy mission requirements next day.

By 0300 – forebodings of doom,
Then a glance out the window dispelled all their gloom!

For there, coming fast, like its tail was on fire,
Was the sleigh, and the reindeer, and one tiny flyer.

He banked, dropped his runners, and set her down slick.
"Never saw such neat handling, this can't be St. Nick!"

He leapt from the sleigh, and they stared with chagrin.
"It isn't St. Nick, this guy's much, much too thin!

"And he's dressed wrong," they muttered, "he isn't in red,
That's certainly not Santa's hat on his head."

With a wink and chuckle, the trim little gent,
Chortled, "You wonder where my obesity went.

"And my clothing should cause
you no loss of good cheer,
From now on I'll be flying in
standard flight gear.

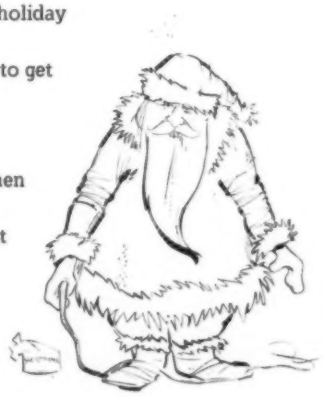
"And as for my airwork, you'll
notice it's great.
All of these things are the
reason I'm late.

"You see," St. Nick paused, and
the folks crowded round,
"By just a chin whisker I
missed getting downed.

"You'll remember I fly only one day a year,
And I stay mighty busy as that day draws near.

"So I get sorta rusty with one annual mission,
My sleighwork by Christmas has lost all precision.

"And despite all the holiday
fiddle and faddle,
I still must find time to get
back in the saddle.



"In previous years when
my timing was off,
I'd worry and panic at
each reindeer cough.

"For Santa's an all-
weather pilot, you
know,
I can never turn
back from the ice and the snow.

"And what's more, toward the end of each holiday season,
I'd get so fatigued I'd be pantin' and wheezin'.

Flies Again!

"The cause was, of course, my
proverbial belly
Which shook, you'll recall, like a
bowl full of jelly.

"On my last annual checkup the doc
set me straight.
For Service Group One, I just had to
lose weight.

"And my flying in past years has
been no sensation,
But this Yuletide I'm out for a new
reputation.

"I've read and reread the sleigh-reindeer NATOPS,
And scheduled a bunch of proficiency hops.

"Well, as I was saying, that's why I was late.
I became so engrossed I lost track of the date.

"That's enough," Santa chuckled, "I've got to get cracking.
There's a world full of children whose gifts need unpacking.

"With my new-found technique, if I'm not too mistaken,
I'll be through with my route long before they awaken.

"I can drop her down smooth on a postage-stamp lawn,
Since I won't be so tired there'll be nary a yawn.

"Though I fly like the wind, I'll be safe as can be,
Cause I've learned 'bout my sleigh, and my reindeer, and me.

"Though I've presents to hand out in batches and bunches,
This year will find Santa less liable to crunches.

"And you know, I don't think that I've had this much fun,
Since my earliest days, DNA Number One."

Then he took to the air with the help of his JATO,
Acquired as a member (good standing) of NATO.

And they heard far and near, from Key West to Seattle,
"Merry Christmas to all, let's get back in the saddle."

LT Norman E. Lane, MSC, USN

PARACHUTING T

By LCDR Paul Furr,
MSC, USN

THE AVERAGE AIRCREWMAN is not an experienced parachutist, yet a safe parachute descent after an emergency bailout is obviously essential to the success of an eventual rescue. Statistics from the Naval Safety Center (1963-1968) show that six percent of the escapes from disabled aircraft resulted in injuries directly related to parachute landings. Further, parachuting techniques were directly responsible for two fatalities. One fatality occurred when an aircrewman impacted the side of a building. The other occurred when an aircrewman was unable to inflate his Mk-3C life preserver due to parachute entanglement and subsequently drowned.

A successful parachute descent begins with egress from the aircraft. In case of ejection, egress is fairly well defined in terms of sequence of events. The factors vital to insuring a successful ejection – ejecting within the envelope of the escape system, assuming good body position and having helmet visor down are well known and much discussed. However, in free bailout a few simple precautions should be taken to insure against parachute entanglement during canopy inflation. It is recommended that you keep your feet together, your arms and head tucked in and assume a semi-fetal position. This posture reduces the probability of entanglement with suspension lines during parachute deployment. Since most free bailouts occur below 15,000 feet, little need be said concerning when to pull the ripcord. The only rule is to clear the aircraft first and this takes just a second or two.

TECHNIQUES

for Naval Aviators

There is little you can do to influence operation of the canopy once a parachute descent has begun. All emergency parachute canopies used by the Navy are symmetrical in design. Navy parachutes do not employ slots, slits or other modifications characteristic of sport parachutes. Thus, limited influence can be exerted in choosing your landing area.

The terrain on which you land is essentially a function of altitude, winds aloft and condition of the parachute – factors over which you have little or no control. Direction, rate of drift and oscillations are dependent upon winds aloft. Rate of descent is dependent upon such factors as air temperature (and density), your weight and the size of your parachute. Normal rate of descent thus varies greatly but 18 feet/second to 24 feet/second is a fair range (comparable to jumping off a 10-foot high stand).

After an inflight emergency escape, a fully inflated, undamaged parachute is a welcome and reassuring sight. However, parachutes can be damaged during deployment. During the years 1963 through 1968, parachute damage occurred in seven percent of 1008 ejections and bailouts, according to Naval Safety Center statistics. Of this seven percent, roughly half represented major rip, tear or burn damage to the canopies yet there were few major injuries on landing.

The above statistics point out an important fact: parachutes can withstand a large amount of damage and still function. Obviously, the greater the damage, the greater the rate of descent. Water landings, of course, help to negate the effects of an increased rate of descent. Surprisingly, however, there is no significant increase in descent rate as the result of a few holes or tears in the parachute canopy. The descent rate may not be drastically increased even if a complete section or gore is damaged. If damage is such that a horizontal motion is imparted to the canopy, a partial cancellation of the increased descent rate will occur. This is due to the lift generated by the horizontal motion – in effect, the canopy acts somewhat like a cambered airfoil.

Although, in most cases, there isn't much you can do if your parachute canopy is damaged, there are a few instances in which you can and should do something to salvage a potentially bad situation, keeping in mind that these instances are rare. One such situation is a "line over," caused by a partial inversion of the canopy during inflation. The friction caused by the motion of the line against the canopy during oscillations can generate enough heat to cut the canopy in two – with disastrous results. You might be able to remove the offending line by "shaking" it off (sometimes the line slips off by itself). In other cases it may be necessary to cut the offending line with your shroud cutter. *Only* the shroud cutter should be used since a straight blade knife may slip and cut too many lines.

Broken suspension lines, formally called shroudlines, are another form of damage. Several consecutive suspension lines can be cut without fear of canopy collapse or without significantly increasing the rate of descent (the cambered airfoil effect again). The exact number of lines has never been definitively established. It is known, however, that a greater number of consecutive lines (say five to seven) can be cut *after* canopy inflation than can be tolerated during inflation.

An erroneous concept which should be dispelled at this time concerns the steerability of current Navy parachutes. Symmetrical canopies cannot be steered. They can, however, be slipped. Thus during a descent you can influence your rate and direction of horizontal drift. This is accomplished by pulling down one or more risers in the direction of desired drift. Slipping a parachute destroys its symmetry; thus a slight increase in rate of descent is to be expected. Though this increase is not significant in terms of a hard versus a soft landing, it will influence the point of landing to some extent. For example, if you are approaching a powerline, slipping toward the powerline in an attempt to overfly it could result in your landing on it or even short of it.

Another problem inherent in symmetrical canopies is their tendency to oscillate. Oscillations are due to wind gusts aloft which are totally unpredictable. It is true that oscillations can be dampened by pulling down on the riser in the direction of the upswing. Timing is important in that the riser must be pulled and released alternately during the upswing and backswing respectively. Some parachutists prefer to rapidly "bounce" a couple of

risers simultaneously for several seconds or until oscillations cease. However, attempts to dampen oscillations at altitude are not recommended since they expend large amounts of energy which can be better used in the survival and rescue operations that will follow the landing.

You have little choice of landing sites once parachute descent has begun. Over clear land, however, it is advantageous to be facing the direction of horizontal travel at the time of landing. Since the canopy cannot be turned, it is recommended that you rotate yourself under the canopy by grasping opposite risers with opposite hands and turning towards the desired direction.

In preparation for the landing itself, a few simple and easy-to-remember rules should be mentioned:

- *Hands on risers.* By holding the risers you will be discouraged from reaching out with your arms to break your fall, which frequently leads to injury to the upper extremities. This is the real purpose of "hands on the risers."

- *Legs together and slightly bent.* A good rule here is to place the feet so that the toes can be seen. In this position the landing fall can be taken in any direction with reduced chance of injury. One should never "reach for the ground." This leads to injury of the feet and legs.

- *Face direction of horizontal travel.* This assumes that the ground is visible and that you are able to rotate yourself under your canopy. Coming in for a landing facing the direction of travel makes for an easier landing fall. In this position you will find it easier to roll onto one side as you fall.

An often discussed topic in parachuting is ability to predict time of impact with the ground by watching the horizon. If the aforementioned rules are followed, observing the horizon or the ground underneath makes little difference to the landing fall.

This discussion, so far, has centered around a clear landing. Irregular ground (boulders, ravines, etc.) and the presence of trees and brush certainly complicate matters. If trees are unavoidable, the well-known technique of crossing the legs and crossing the arms over the face (head tucked down in the arms) still applies. One might consider the advantages of keeping the oxygen mask on (loosely) and helmet visor down. Irregular terrain doesn't make for good landings. Slipping the canopy skillfully may ease the hazard. But, here the novice is depending more on luck than on skill.

Water landings are the easiest of all. They are relatively soft, with no irregular terrain and no vegetation to worry about. Some obvious problems here are shroudline entanglement, flotation and exposure.

Entanglement continues to be a problem. (Naval

Safety Center records indicate that entanglement problems were involved in 37 percent of all overwater ejections during the five-year period ending 30 June 1969.) The ultimate solution to the problem may very well be an automatic canopy release device, which the Naval Safety Center endorses. Another approach may be the encapsulating liferaft which the Naval Aerospace Recovery Facility is slated to evaluate. In the meantime the answer is training. To help avoid parachute entanglement, inflate your life preserver during parachute descent if at all possible; carry a shroudline cutter; enter your raft as soon as possible and, above all, remain calm and temper your movements.

The training film, "Rigid Seat Survival Kits," (MN-9902A2) addresses the subject of use of the RSSK (rigid seat survival kit) during emergency egress. There is much controversy at present on this subject. Removing the oxygen mask, actuating personal flotation gear and deploying the contents of the RSSK during descent are based on the philosophy that the more you do to prepare for water/land survival while descending, the less you have to do in the first few moments after landing. But there are many variations to this theme. Obviously, common sense should dictate procedure. For example, if you are to avoid entanglement with branches, the RSSK might be left undeployed.

The RSSK aspect of parachuting is a difficult subject to legislate in NATOPS and other publications. For example, some aircrewmen have complained of increased oscillations during descent when the RSSK was deployed. Others have reported a dampening effect on oscillations. Indeed, on one occasion when pilot and RIO punched out of an F-4, one complained of increased oscillations due to RSSK deployment, the other experienced a dampening effect.

Much has been said concerning the pros and cons of having aircrewmen make parachute jumps as part of their flight training. The consensus seems to recommend against it from the point of view of cost effectiveness (value of training versus cost in time, money and possible injuries). Thus no formal parachuting course exists for student aviators and aircrewmen. Some Aerospace Physiological Training Units include a few comments concerning parachuting techniques in ejection seat lectures and some training in parachute landing and survival is taught at various survival training schools, both Air Force and Navy. In order to alleviate the lack of training there are several Navy and Air Force training films on the subject of emergency parachuting which could be shown to all hands.

Though the incidence of damaged parachutes and injuries associated with parachuting is less than 10 percent, injuries which do occur will reduce your chances for a successful survival and rescue. By adhering to a few basic rules, the probability of landing injuries can hopefully be further reduced. Follow these rules and enjoy the ride down – it can be quite peaceful and serene – if you can relax long enough to notice it! ◄

Undesirable Tenant!

THERE ARE numerous accounts related to the many strange things that have happened to some members of the naval aviation community. Once in a while one of these incidents is so unusual that it should be passed on to others for full appreciation. The following incident falls into this category.

After an A-4 pilot had preflighted his aircraft, climbed aboard, strapped in and checked the cockpit and controls, he then gave the plane director the turnup signal that he was ready for engine start. The *Huffer* was engaged and, at the moment that the starter hose began to stiffen, the pilot detected an object flying through the air toward him. Reflex action caused him to duck slightly whereby the object entered his flight suit at the neckline and went down his back. The pilot, being completely strapped in, could not reach the object to extract it. It was *red hot* and began to blister the pilot's back as his futile attempts to retrieve it only worked the object further down his back, causing more blisters.

When the object was finally retrieved (which seemed like four hours and 25 minutes later to the pilot), it was found to be a part of a huge Puerto Rican land crab that had crawled into the *Huffer* exhaust and was ejected when airstart was initiated.

Whenever *Huffers* are about to be started in that locality, you can be assured that they have been thoroughly preflighted against stowaways in the exhaust port.

Strobe

AN A-4 pilot ejected on a night so black he couldn't tell where the water was. During descent he located his koch fittings, deployed his raft and turned on his strobe light. When the raft hit the water he knew he was approaching the surface. He released the chute, pulled the raft to him and boarded. Then he contacted search aircraft and vectored the rescue helo in with his radio.

Rescue personnel never did see the pilot's strobe light. Presumably the light was obscured by the inflated life preserver.

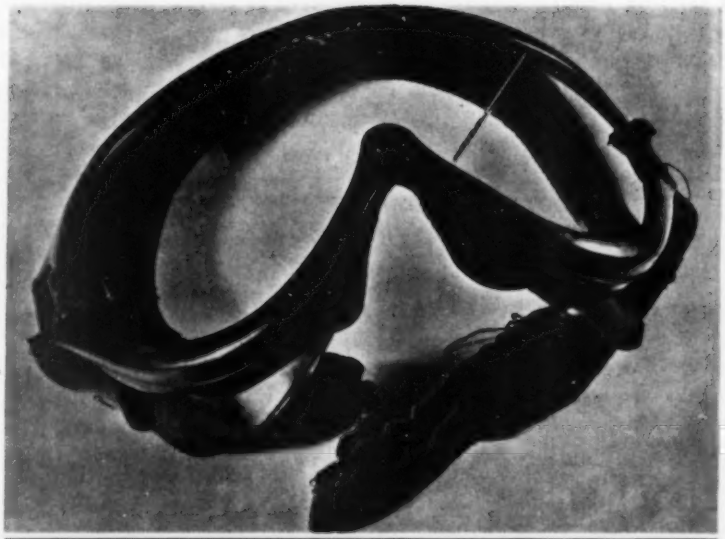
Air Crew Systems Bulletin 150 describes installation of velcro on helmet and light so that the light can be attached to the helmet to free the survivor's hands and make the light more visible to rescuers.

Without a Scratch

A PILOT who ejected from an A-4 "walked away" from the accident without a scratch.

"I am impressed by this pilot's thorough preparedness and knowledge of emergency procedures," the investigating flight surgeon reports. "I also feel that his systematic application of proper ejection and parachute landing technique was the explanation for his being able to walk away from the accident without a scratch."

This particular pilot had two things going for him that most pilots don't have. He had many hours of experience as a sport parachute jumper and he had spent two years as squadron survival officer.



WHEN the ASM-2 wearing these goggles heard the Air Boss broadcast "Goggles down!" he did just that and he will be thankful for the rest of his life. A recovery had just been completed and the last aircraft aboard, an F-8, was being taxied forward. The F-8's exhaust picked up the drill bit (an interesting bit of FOD) and embedded it in the ASM-2's goggles. He was not injured. There was no luck involved here – just preparation for the unexpected.

Safety Officer
ORISKANY (CVA-34)

If the pilot had not been able to manipulate his risers effectively, he would have landed in 34°F water without an anti-exposure suit. (The suit was not required on this flight.) Instead he landed in trees. Breaking through the branches on impact he touched down feet first, detached from his harness and walked to a nearby road.

"In summary," the flight surgeon writes, "his actions represent the ideal reaction to an inflight emergency and point out the value of thorough knowledge of emergency procedures."

You may not be a sports jumper or a squadron survival officer but thorough knowledge of emergency procedures is within any pilot's or crewman's reach.

Good Health and Long Life

ALTHOUGH two of the crew in a helicopter accident released their restraining harnesses before the helo came to a stop in the water, they were unhurt. The fact that they lucked out should *not* be taken as justification for this practice, the flight surgeon says.

"The wild gyrations of a helicopter after it enters the water with rotors turning are well known," he writes. "Being

notes from your flight surgeon

unrestrained inside the helicopter during these maneuvers is not conducive to good health and long life."

Swimmer Training and SV-2 Leg Straps

NIGHT rescue of an injured A-7 pilot was considerably complicated by the swimmer's relative inexperience and unfamiliarity with the pilot's survival equipment. Without going into the various difficulties encountered before the pilot was back aboard ship, here are the investigating flight surgeon's thoughts on training rescue crewmen for night operations.

"Night operations are exceedingly demanding and not the place for on-the-job training. Simulated rescue training in an unlit pool at night might be of value. Concerning the inability of the rescue swimmer in this instance to locate the pilot's D-ring, I feel that in most cases the D-ring can be found regardless of interfering equipment because it is attached to the torso harness in a relatively fixed position. To this end, I recommend that training be given in the dark on methods of locating various pieces of equipment. In this case, grabbing the torso strap high on the right shoulder and manually following it down the chest would probably have led to the discovery of the D-ring. Rescue personnel should have intimate knowledge of all equipment they might come in contact with. Furthermore, they should be able to find it under adverse conditions blindfolded."

Cause of the crewman's difficulty in locating the survivor's D-ring was the fact that the pilot's SV-2 survival vest had ridden up over it when his Mk-3C life preserver was inflated. The survival vest did not have crotch straps which would have held it down. The SV-2A vest is designed with crotch straps. Compliance with Air Crew Systems Change 162 updates the SV-2 which includes addition of crotch straps.

"The way my wife drives, if she were an Arab, she'd come home with a dented camel."

On and Off and On Again

THE PILOT reported after ejection and rescue that upon release of the seat pan while in the water, his head was pulled under. He suspects his radio cord caught on the seat pan as it was released. He removed his helmet but later recovered it and put it back on. (This prevented possible serious injury when his head hit the wheelwell of the helo during recovery.)

Shortcut

IF A TA-4F pilot had accepted an equipment shortcut proposed on the flight line he could have had trouble later in the flight when he ejected.

After preflighting and strapping in, the pilot was unable to conduct a satisfactory ICS check with the copilot when electrical power was connected. He could hear the copilot but was unable to transmit on ICS once electrical power was applied to the aircraft. An avionics technician who came to check the trouble said after testing that the connections in the pilot's seat pan were bad but that he believed he could connect the pilot's integrated oxygen/communications hose to the aircraft and bypass the seat. This would only take a few minutes, he said. The pilot asked if he would have emergency bailout oxygen with this arrangement. The technician said he would not. The pilot then said he would wait until it was fixed properly and he unstrapped and got out of the aircraft. The trouble was rectified by changing the seat pan.

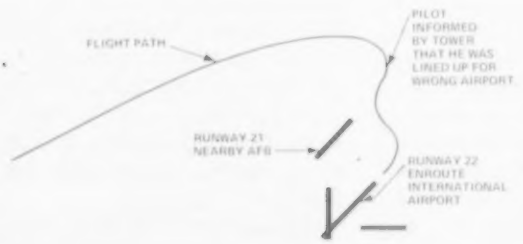
"In retrospect," the pilot writes, "if I had connected my oxygen hose directly to the aircraft, my neck would have taken the full force of disconnecting when ejection was initiated. I recommend that *all* aviators be reminded again of the serious consequences possible if they accept shortcuts or jury rigs in order to get airborne. If I had connected the hose directly to the aircraft console I might not be here writing this."

The squadron has taken action to ensure that such a shortcut is not proposed again. ◄

UNINTENTIONAL WHEELS UP

UNINTENTIONAL wheels-up landings have occurred with distressing regularity since shortly after the introduction of aircraft with retractable landing gear. Many procedures and devices have been introduced over the years to prevent such accidents but none of them have been completely successful. NAVSAFECEN records show that wheels-up landings still occur.

Wheels-up landings result from a variety of reasons: distraction, complacency, inattention, fatigue or failure to use a checklist, to name a few. However, the underlying cause of most wheels-up landings appears to be an interruption of established habit patterns. This may result from some distraction during the approach such as concern for conflicting traffic or it may be caused by some stressful situation (such as low fuel state) which causes the pilot to deviate from his usual way of doing things. In any case, an unintentional wheels-up landing is seldom the inevitable result of any single factor. Rather, it is likely to be the culmination of a series of failures by personnel and/or warning devices. Three of the unintentional wheels-up landings reported to NAVSAFECEN have been selected to illustrate the manner in which circumstances can combine to produce a wheels-up landing.


FLIGHT PATH
PILOT INFORMED BY TOWER THAT HE WAS LINED UP FOR WRONG AIRPORT
RUNWAY 21 NEARBY AFB
RUNWAY 22 ENROUTE INTERNATIONAL AIRPORT

E-1B Accident
Pilot Lined Up for Wrong Runway

The pilot, copilot and three passengers were on a cross-country airways training flight from NAS West Coast to Midwest AFB with a fuel stop at Enroute International Airport.

Upon approaching Enroute International Airport the copilot switched from Center frequency to Enroute Approach Control frequency and was advised that the aircraft would be given radar vectors for a tight downwind entry to runway 22. The prelanding checklist was completed. Approach control then vectored the aircraft to a right base leg five miles north of the airport and asked if the pilot had the runway in sight. The pilot reported the runway in sight and the aircraft was switched to tower frequency for landing instructions. The landing checklist was completed and the copilot called the tower stating the aircraft was "on final with three down and locked." The tower rogered this transmission and advised the aircraft that they were lining up with runway 21 of Nearby AFB instead of runway 22 at Enroute International Airport. The tower then advised the E-1B to make a left turn to line up with runway 22. (See diagram.)

The pilot added power, picked up the landing gear and climbed from 500 feet to 800 feet, in a left turn to intercept the landing line for the correct runway. The pilot asked the tower if he was cleared to land. This was "rogered." The pilot then set the propellers to full increase RPM and completed the landing *without resetting the landing gear to the down position.* The aircraft touched down about 3200 feet from the approach end of the runway on centerline and skidded to a stop about 5700 feet from the approach end. There was no fire and all occupants evacuated the aircraft without injury.

Continued

LANDINGS

During the investigation of the accident it was determined that the pilot knew about Nearby AFB but erroneously thought it was closed for the night and therefore did not expect to see a lighted runway. Considering the proximity of Nearby AFB to Enroute International, this accounts in part for the pilot's error in originally lining up with the wrong runway.

The investigators also discovered that the aircraft had a history of wheels warning light malfunctions. Of the 21 previous flights, four yellow sheets had discrepancies on the wheels warning system. All discrepancies indicated that the wheels warning light had come on at too high a power setting (24 to 27 inches of manifold pressure instead of the correct 20 inches). The corrective action by maintenance personnel had been to adjust the throttle switches and request an inflight check; however, a satisfactory inflight check was not indicated on any of the yellow sheets.

The wheels warning system was ground checked after the accident and found to be functioning properly; however, the pilot stated that the light did not function until after impact with the runway. Taking into account the past history of the wheels warning system malfunctions, the investigators concluded that the wheels warning system could have malfunctioned during the approach.

The aircraft accident board in its report stated: "On reviewing past unintentional wheels-up landings, in each case something has interrupted the usual chain of events to a normal landing. So it is with this case. A normal landing would have been executed if the pilot had initially lined up on the correct runway but the confusion and embarrassment of almost landing at the wrong airport consequently broke the normal habit pattern."

The board concluded that the pilot was primarily responsible for the accident but listed the following contributing cause factors:

- Lack of support by copilot.
- Wheels warning light malfunctioning.
- Inadvertent approach to the wrong airport in proximity to the intended destination.

S-2E Accident
Pilots Ignored Checklist

An S-2E with a pilot and copilot aboard returned to home field for touch-and-go landing practice after a four hour familiarization flight.

After clearance into the pattern the pilot completed three normal touch-and-go landings. The copilot reported the wheels down on turning base in each instance. At the 180-degree position for the fourth touch-and-go the copilot reported turning base but did not state that the wheels were down. Nevertheless, the tower cleared the aircraft for a touch-and-go landing. The approach was continued in a normal manner and touchdown was made on the radome 1420 feet down the runway. The aircraft continued to slide and came to rest after 2770 feet of travel. Both pilots exited the aircraft through their respective overhead hatches without injury.

During the investigation both pilots stated that they executed the prelanding checklist and the landing checklist prior to the first touch-and-go landing. The aircraft accident board noted that the auto feather switch (a key item on the prelanding checklist) was not armed. This, the board said, cast some doubt as to the thoroughness with which the checklist was executed.

The copilot had reported the wheels down turning base on each of the first three approaches but stated he had done this automatically and was not requested to do so by the pilot. *Both pilots admitted they did not employ the checklist after the first approach* and the pilot performed the repetitive items (gear, flaps and props) from memory and habit. Both pilots also admitted they knew that these are mandatory challenge and reply items. On the downwind leg of the fourth approach transmissions from two other aircraft attempting to obtain entry/landing clearance occurred at the approximate point in the pattern where the pilot had previously been lowering the gear. Both pilots stated they attempted to visually sight the other aircraft. Full flaps were lowered during the approach but the pilot does not recall when he accomplished this. It is conceivable that the momentary distraction of attempting to sight the other aircraft was sufficient to upset the already inadequate method of completing the items required for landing causing the pilot to bypass the gear and proceed directly to the flaps. Having lowered the flaps the pilot apparently satisfied himself that all was in order and was confident to the point that he did not sense a need to recheck as was his stated practice.

The wheels warning light was tested and found to commence flashing at or below 21 inches of manifold pressure. The pilot could not recall the exact power setting used during the approach but did state that he closed the throttles just prior to touchdown. Although neither pilot noticed the light, the board stated there was no reason to believe it was not flashing just prior to impact.

The board concluded that the primary cause factor in this accident was the failure on the part of the pilots to comply with procedures for checking the landing gear as outlined in the S-2D/E NATOPS manual. The manual specifically states that the landing gear, flaps and propellers shall be checked utilizing the challenge and

reply method prior to each landing. Failure of the tower operator to adhere to existing directives was also listed as a contributing cause factor. The transcript of the air to ground communications during the approach revealed that no wheels down report was given by the aircraft, yet landing clearance was issued by the tower. It is conceivable that this accident would not have occurred if the tower had complied with standing directives which prohibit the issuance of a landing clearance until the aircraft gives a wheels down report.

F-8J Accident
Pilot Moved Wrong Handle

The pilot was scheduled for an air intercept training flight with a Case III recovery after sunset. He departed Marshall inbound on time and penetrated normally; however, his first approach was broken off early for inadequate aircraft separation. The second approach resulted in a bolter whereupon the pilot was given a steer to the nearest naval air station.

The naval air station was about 70 miles away and the F-8's bingo fuel was 1550 pounds, however, the pilot commenced his bingo profile with about 1400 pounds of fuel. He cleaned up, climbed to 15,000 feet and proceeded toward NAS, commencing his descent at about 25 miles. The pilot then declared a low state emergency. Initially, he requested a straight-in approach and was so cleared but as he approached the field, he decided to break overhead at pattern altitude. The break was executed at about a 40-degree angle to the runway and resulted in a close abeam position downwind.

At about the 180-degree position the pilot lowered the gear handle and at the 90-degree position raised the wing. The tower gave clearance to land on the left parallel runway. The pilot, feeling that he had overshot the left runway, requested and received clearance to land on the right runway. At this time the BLC was turned on.

About 10 seconds prior to touchdown the tower advised the pilot to check the gear down and hook up. He acknowledged with "Roger." At or about this time the wheels watch visually checked the aircraft and noted the landing gear and hook down.

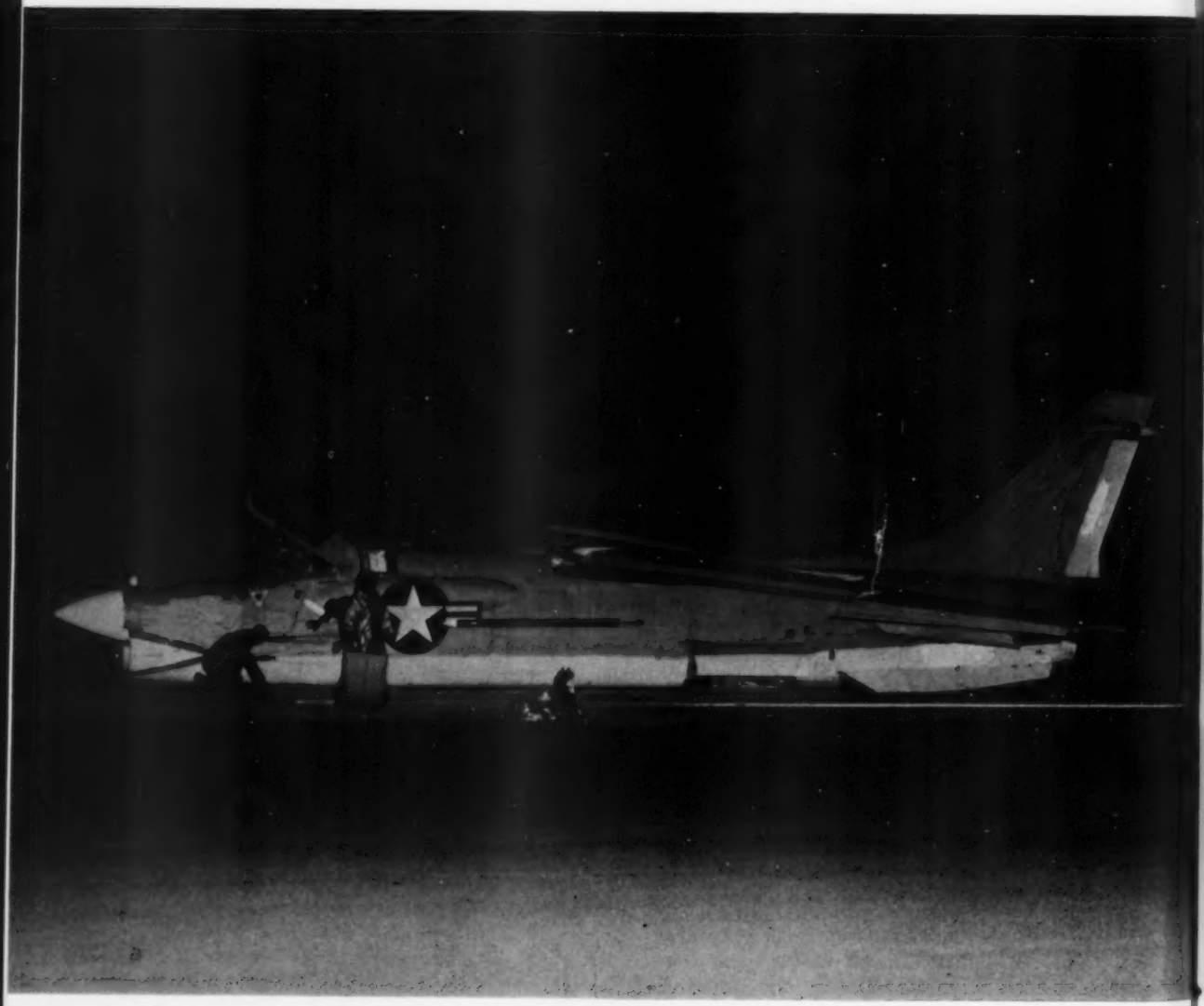
The aircraft subsequently impacted the runway about 1100 feet from the approach end with landing gear fully up and hook down. The tower, seeing sparks, advised the

pilot that it appeared he had blown a tire. The pilot replied that the gear had collapsed. He secured the engine by moving the throttle to off, meanwhile maintaining some directional control with the rudder. The aircraft slid down the centerline for about 3900 feet. When the aircraft stopped the pilot opened the canopy and egressed normally.

Inspection of the cockpit following the mishap revealed the hook handle and the landing gear handle were in the down position. The main fuel gage indicated 500 pounds of fuel remaining. Inspection of the exterior showed positive evidence that the hook was down and landing gear was up when the aircraft impacted the runway.

The aircraft was placed on jacks, hydraulic pressure and external power applied and the landing gear was cycled several times. The extension and retraction of the landing gear was normal in all respects. When the landing gear was extended, it locked in place mechanically and hydraulically.

The aircraft accident board stated the belief that just prior to landing the pilot had unintentionally raised the landing gear handle instead of the hook handle after the tower requested a gear down, hook up check. The board concluded the primary cause was pilot factor in judgment. It recommended reemphasis on the necessity for following established procedures and for careful, purposeful checking of each item on landing checklists,



especially in the presence of distractions.

An endorser to the AAR wrote:

"The board's recommendation is indeed a valid one. This accident, however, does not follow the pattern of the classic wheels-up landing accident which is characterized by pilot distraction and the pilot's failure to lower the landing gear. In this case, the pilot *raised* his gear at some point between the 90-degree position and touchdown, *after* having positioned them in the down position for landing. Why the pilot raised the gear instead of the hook is conjectural, but bears further discussion.

"The pilot began to rush himself from the point of his declaration to shoot a straight-in to a relatively strange field at night. An overhead pattern, with which a pilot is intimately familiar, costs little more than 100 pounds of additional fuel when compared with a perfectly executed straight-in approach. A pilot's ability to judge correctly the gear down/wing up/BLC configuration change positions relative to a runway at night on a straight-in approach is questionable, even if practiced. Additionally, any errors in judgment cut into the small saving of fuel which the straight-in approach initially offers. When the pilot decided to execute an overhead pattern, he again rushed himself and did not take time to set himself up properly by paralleling the runway heading. The pilot broke 40 degrees off the runway heading at 300 knots, ultimately resulting in a tight abeam position. The pilot continued to rush the landing pattern by not raising the wing until the 90-degree position and delaying the selection of BLC until turning final. The approach could hardly be termed normal.

"If we are to prevent future accidents of this type we must not only emphasize the need to use the checkoff list but also the absolute necessity, when under stress, to perform the various flight maneuvers as closely to established norms as possible. At any of the several stages in the final moments of flight this accident could have been prevented had the pilot overcome his anxiety over his fuel state and established a truly normal pattern. When the stresses are high pilots must be disciplined to adhere to those patterns of flight with which they are most familiar."

Preventing Wheels-up Landings

There is no readily apparent final solution to the problem of unintentional wheels-up landings. It seems to be a matter of maintaining an awareness of the problem and taking all possible precautions.

First and foremost among the precautions should be the determination to comply with appropriate checklists. Even so, we must recognize that this is not a cure-all. Situations do arise, particularly after the aircraft has passed the 180-degree position, which operate to undo or cancel the benefit of the checklist. However, a wheels-up landing is not inevitable if other safeguards are operating as intended. This includes wheels watches, appropriate observation of aircraft by tower personnel and correctly maintained warning devices in the aircraft.

- Wheels watches, to be fully effective, must be posted in a location which will permit them to observe the aircraft at a point where they will still have time to issue a warning. They must also be provided with appropriate warning equipment. Standing a wheels watch can be a monotonous chore and continuing efforts must be made to impress on wheels watch personnel that their job is an important one. They must not become bored to the point that they become ineffective. One way to encourage alertness is for the operations officer to occasionally arrange for an aircraft to make an intentional gear up pass (under carefully controlled conditions, of course).

- Tower personnel are required by standing directives to obtain a positive pilot report that the landing gear is down prior to issuing a landing clearance. In addition to requiring a positive gear check, tower operators can perform a valuable service by observing the aircraft during the approach and visually checking the gear down whenever possible.

- All Navy aircraft have some system designed to warn pilots if they attempt to land without extending the landing gear. This system may be a horn, lights or both. But, whatever type of warning system is used it cannot perform its designed function unless it is properly adjusted and maintained. Pilots can contribute to good maintenance by reporting discrepancies in detail and by carefully checking system operation after maintenance has been completed.

As valuable as wheels watches, tower operators and warning devices are in preventing wheels-up landing accidents, it is the pilot who must bear the final responsibility when a wheels-up landing does occur. The pilot must therefore continue to look to himself as the primary means of preventing wheels-up accidents. He must not only resolve to make full use of the checklist prior to landing but try to remain continuously aware during landing approaches that a wheels-up landing is always a possibility. He must guard against flying when he is unduly fatigued and fight any tendency toward complacency, boredom, inattention or undue anxiety. In particular, pilots will do well to regard any interruption or deviation in the usual approach pattern or procedures as a warning and carefully reassess the situation prior to landing.

Wheels-up landings still happen. Don't let it happen to you!

LIGHTNING

By Jack Sheehan, Flight Safety Engineer
Courtesy McDonnell Douglas Product Support Digest

CONCERN for lightning has been part of man's nature since Adam and Eve. Man has found it unnerving and destructive and has discovered no way, up to this day, to prevent or completely control this natural phenomenon. Lightning is an integral part of the earth-ionosphere electrical cycle wherein the earth maintains a surplus of negative electrons.

A few words on the earth-ionosphere electrical cycle would be appropriate at this point to aid in understanding the lightning phenomenon. The air around the earth is composed of varying proportions of neutral molecules and positive and negative ions. As the number of ions in the air gradually increases, the air becomes a better conductor; the higher you ascend above the earth the more ions are present. However, for measurement purposes, less than one molecule in a million is ionized even in the ionosphere. The ionosphere is considered not to favor a negative or positive potential; the number of positive ions is equal to the number of negative ions.

Earth has a negative charge, usually considered in excess of 300,000 volts negative with respect to the ionosphere. The earth through ionic current will lose an infinitesimal amount of this potential; this discharge is conveniently conducted through avenues which offer the least path of resistance between earth and ionosphere; i.e., tall buildings, trees, grass and even human beings. This is known as "point discharge."

The thunderstorm is the generator that returns the earth's electrons which have been lost by ionic conduction. Daily, thousands of thunderstorms over the face of the earth transport electrons back to the ground through the lightning bolt. A small percentage of

lightning strikes to the ground will discharge electrons from the ground to positively charged regions in the clouds. The cumulonimbus clouds, which are all too familiar to aviators, extend from altitudes of 3000 to above 50,000 feet and can contain the potential to destroy aircraft. Thunderstorms produce updrafts and downdrafts that range from 35 to more than 70 miles per hour and contain tons of water that at low temperatures produce ice crystals. This turbulence of water and ice colliding and rubbing together is responsible for the production of the tremendous electrical potential within a cumulonimbus cloud. The base of a thunderstorm, when measured with respect to the earth, can contain a potential difference of 10 to 100 million volts.

Lightning Effects on Aircraft

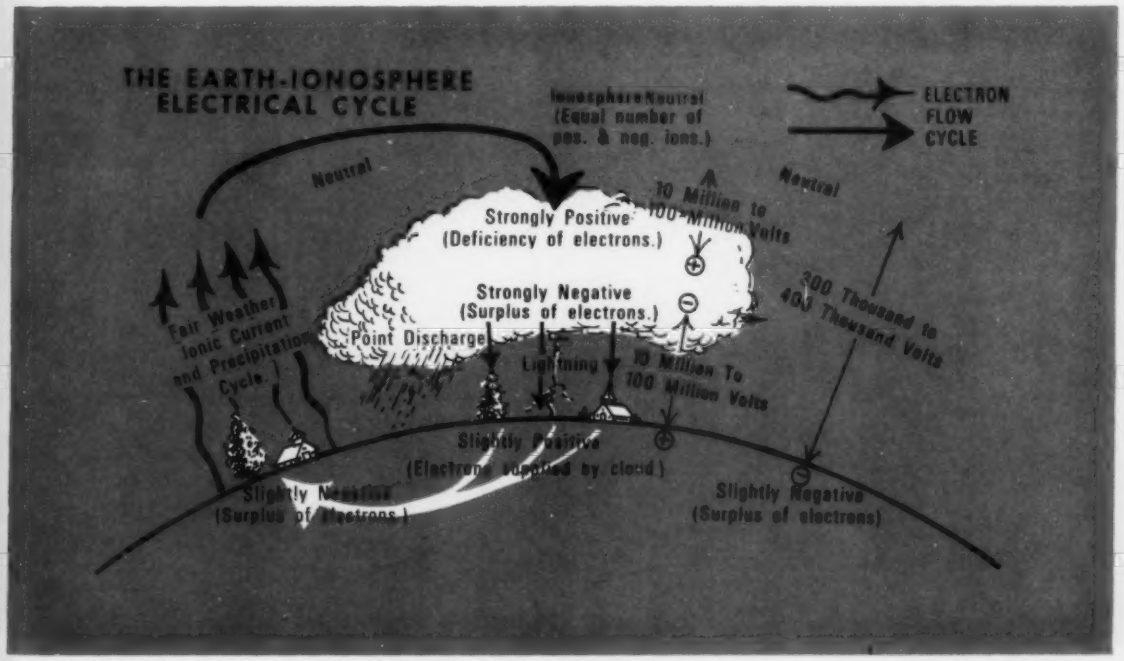
Why does lightning strike an aircraft? This age old question has not been answered to everyone's complete satisfaction, and I don't expect to, either. The most logical theories based on research by NASA, USAF, ESSA (Environmental Sciences and Services Administration) and LTRI (Lightning and Transients Research Institute) as well as others indicate that in keeping with the physical nature of the earth's ionosphere electrical cycle, lightning has a natural unpredictable path, and when an aircraft intercepts this path, it gets hit. Further research seems to indicate that aircraft flying in proximity to thunderstorms can trigger lightning. The fact that lightning has occurred where there was no previous lightning appears to substantiate this theory. The crux of the proximity theories indicate that the aircraft becoming charged either by friction or as the result of passing through a charged region in the atmosphere and approaching another charge center will, when close enough, induce a strike to itself or discharge itself to a close cloud. This theory at least portends the possibility, and may in fact explain many of the "in the clear" or "between the cloud layer" lightning strikes.

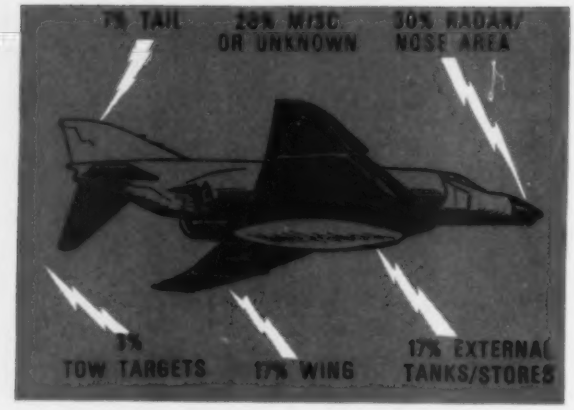
Types of lightning troublesome to aviation can be classified as:

- Cloud to Cloud – The most prevalent discharge encountered by aviators. Is estimated in the area of 100-10,000 amperes, may occur 10-20 times per second, and is most prevalent in arid regions.
- Cloud to Ground – The most powerful charge measured, as witnessed by damage to trees and buildings. This type inflicts the substantial aircraft damage.
- Lightning Discharged Within the Cloud – Neutralize two charged regions within the cloud. These discharges are estimated in the order of 100 amperes.
- Air Discharge – The least likely to be encountered. These are discharges through clear air and have been known to radiate for forty miles.

Lightning Effects on the F-4 Aircraft

Granted, over the inventory life of the *Phantom*, it has received its share of lightning strikes; some critics


THE EARTH-IONOSPHERE ELECTRICAL CYCLE
Ionosphere Neutral (Equal number of pos. & neg. ions.)
ELECTRON FLOW CYCLE
Neutral
Neutral
10 Million to 100 Million Volts
Strongly Positive (Deficiency of electrons.)
Strongly Negative (Surplus of electrons.)
Fair Weather Ionic Current and Precipitation Cycle
Point Discharge
Lightning
10 Million To 100 Million Volts
300 Thousand to 400 Thousand Volts
Slightly Positive (Electrons repulsed by cloud)
Slightly Negative (Surplus of electrons)
Slightly Negative (Surplus of electrons)

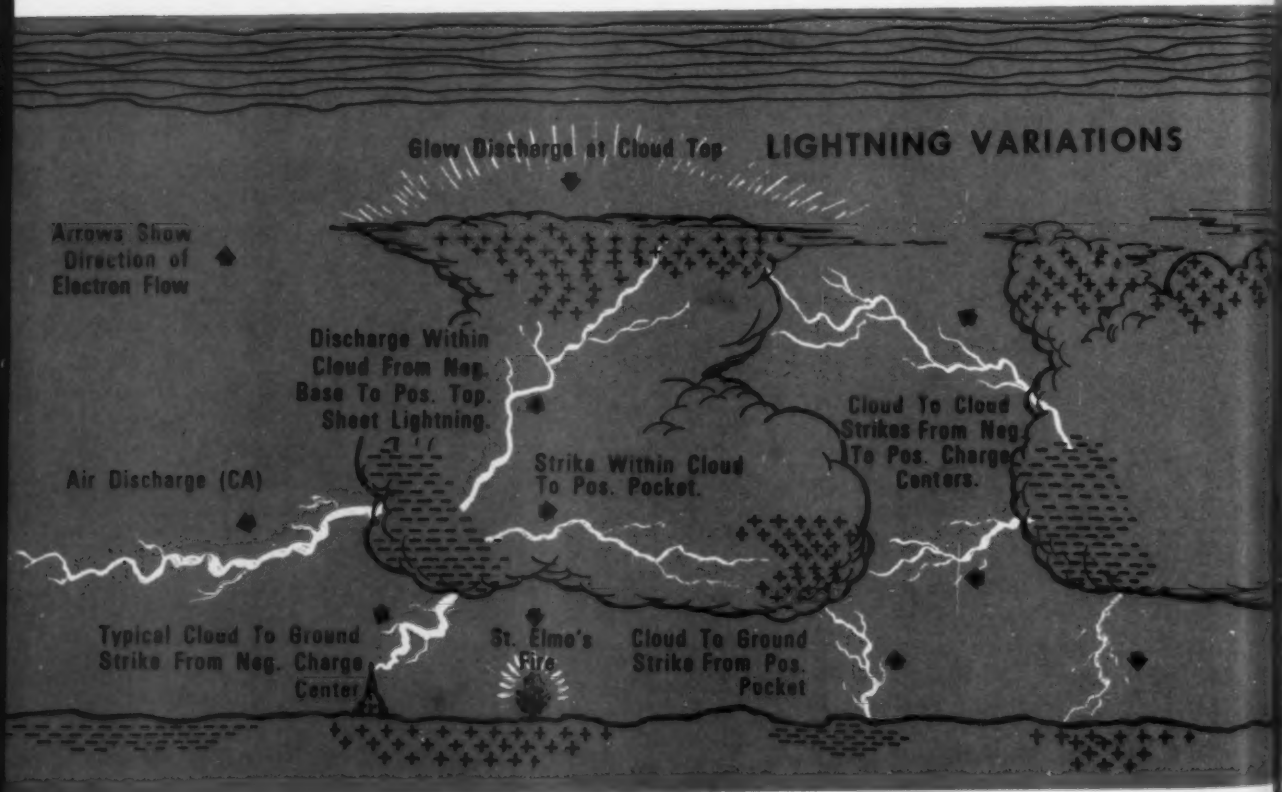


think too many, in fact. Let's take a look at where lightning struck *Phantoms:* (See diagram above).

The high number of strikes to the radar area would tend to substantiate the thoughts some people have on radar as being an attractor of lightning. A good theory – however, the facts point to the area rather than the emittance being responsible. Why should a non-conductive radome be struck? The explanation seems to be the pitot tube, antenna, or the equipment within being struck by a lightning bolt, thus the radome acting as a dielectric (not carrying off the charge) allows buildup of intense heating within the radome material. Damage may range from very little to fairly large holes. However, in some instances, probably assisted by wind loads, complete loss of a radome with resultant secondary damage to the aircraft from the radome material or antenna has occurred. This type of damage can knock out airspeed, altitude and vertical velocity indications and in cases where the radome breaks up, the angle-of-attack probe may be damaged or the engine may be fodded.

Lightning Attraction Theory

Emitted radar energy is of a high enough order that in some combinations of wavelengths, range and power can burn internally, illuminate incandescent lamps, or perform other mysterious feats. With these phenomena, speculation as to its abilities to cause ionization of the atmosphere has given rise to the theory that radar can attract lightning. Research conducted by LTRI into this area concludes that although the possibility exists, the evidence tends to refute the theory because the most


LIGHTNING VARIATIONS
Glow Discharge at Cloud Top
Arrows Show Direction of Electron Flow
Discharge Within Cloud From Neg. Base To Pos. Top. Sheet Lightning.
Air Discharge (CA)
Strike Within Cloud To Pos. Pocket.
Cloud To Cloud Strikes From Neg. To Pos. Charge Centers.
Typical Cloud To Ground Strike From Neg. Charge Center
St. Elmo's Fire
Cloud To Ground Strike From Pos. Pocket

intense radar beams are of a very low order of magnitude when compared to nature's potential.

Lightning Protection for Aircraft

Protection for jet aircraft nose radar has been technically possible for a number of years. However, the methods necessary can, and in some applications have, detracted from the performance of the radar. To effect lightning protection at the expense of radar efficiency is a questionable solution to a problem that has such a low incidence rate. The addition of a permanent or consumable diverter to the nose of an aircraft without an adequate development program can jeopardize the basic mission performance of the aircraft, and perhaps provide only marginal lightning protection.

The incidence of lightning strikes seems to be in proportion to the amount of flight hours conducted in the lower altitude regions wherein lightning is known to be more active. Geography seems to play an important part in determining the frequency of lightning discharges to the ground in a thunderstorm, and hence, would be responsible for the more powerful strikes occurring at the lower altitudes. Research accomplished by Stanford University maintains that the frequency of cloud-to-ground lightning increases with latitude. Available data on aircraft lightning strikes tends to support this research. The amount of lightning strikes recorded in Europe as compared to SEA and USA is greater.

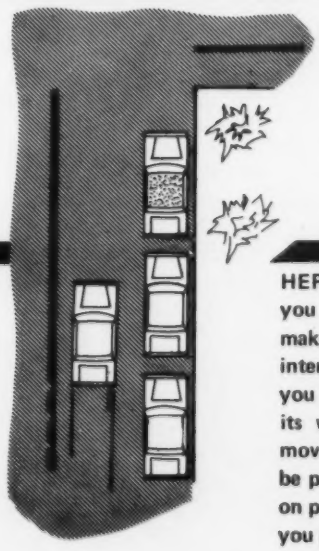
Lightning Avoidance

Since most authoritative circles hold to the fact that an aircraft flying near a thunderstorm will only be struck if it happens to pass near the natural bolt path or upsets a static condition, the solution should be to stay away from thunderstorm areas. At any rate, the consideration for thunderstorm avoidance should primarily be turbulence, hail or freezing precipitation, and lastly, lightning. However, implementation of the rule of thunderstorm avoidance has to be up to the aircrews; every pilot has been confronted with the actuality of a storm, which in some cases is nothing like the preflight brief or enroute ground radar reports. In the event that thunderstorms cannot be avoided, a little statistical information may help.

The preponderance of lightning strikes takes place below 20,000 feet, mostly occurring between 5000 and 10,000 feet, with 80 percent occurring in the temperature range of $-10^{0}C$ to $+10^{0}C$. Thus, forewarned, aircrews hopefully can adjust courses to avoid the aforementioned conditions. Radar equipped aircraft can monitor the progress of thunderstorms and isolate the cells from the intended flight path that indicate precipitation. Regardless of all the forewarning, flight observation and good airmanship, lightning will continue to affect aircraft.

Efforts have been expended by the McDonnell Douglas Engineering Department in studies and evaluations of aircraft lightning strikes, particularly in the commercial aircraft field. However, as you have just read, military fighter/reconnaissance type aircraft are also experiencing inflight lightning strikes. Although no formal customer requests have been received for a study, Engineering has been doing extensive company-sponsored research and investigation into lightning protection for the *Phantom* and future aircraft.

traffic teaser



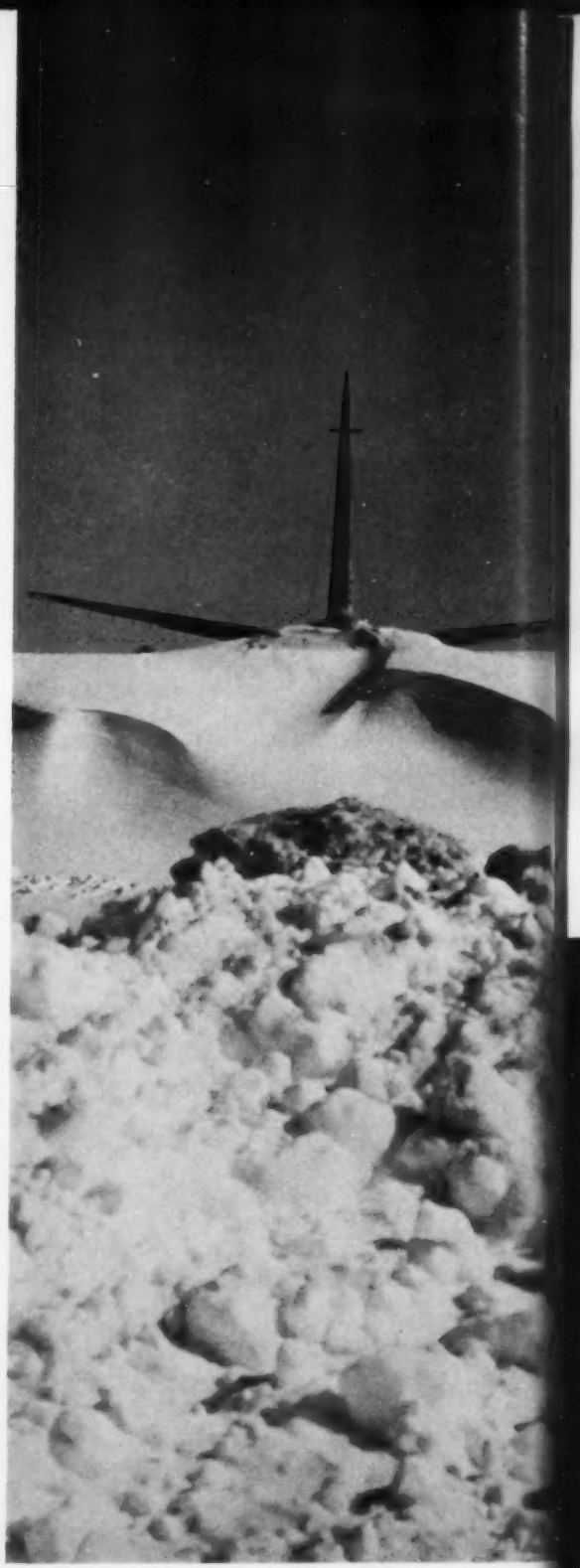
WHAT'S WRONG HERE? You are in the car approaching the intersection. Aside from the cars parked along the right curb, there are no other cars on either street and you have the right-of-way. Should you go ahead and make a right turn?

HERE'S WHAT'S WRONG: Before you start turning, check closely to make sure the car parked near the intersection won't pull out just as you turn. Look for a driver behind its wheel; watch for exhaust and movement of the front wheels. And be particularly wary of buses taking on passengers at intersections where you plan to turn right.

AIRCRAFT ICING

By First Lieutenant Thomas E. Sieland, USAF
Weather Officer, Det. 9, 16th Weather Squadron
Cairns AAF

Courtesy U.S. Army Aviation Digest



DURING late fall and early winter, the freezing level in the atmosphere begins to descend until in many areas it reaches the earth's surface. This greatly increases the problem of aircraft icing. Forecasting icing is the weatherman's problem but the job of understanding the types and intensities of icing and what to do about them belongs to the aviators.

Before we define the types and intensities of icing, let's see how aircraft icing is formed. To have aircraft icing, two conditions must exist; the temperature of the skin of the aircraft must be below 0^0C and liquid water must come in contact with the skin of the aircraft. It is well known that the worst icing conditions occur in clouds where the liquid water content consists of supercooled water droplets. These droplets are great in number and are supported by rising air currents. Such conditions are usually more predominant in unstable or convectively unstable clouds such as thunderstorm clouds.

(Editor's Note: Structural icing is possible in the temperature range between 0^0 and -40^0C. However, very little icing normally occurs at the colder temperatures, -30^0 to -40^0C, because of the infrequent occurrence of supercooled water droplets at these temperatures. Structural icing is reported to occur most frequently between 0^0 and -17^0C with the majority of cases falling in the range between -3^0 and -12^0C.)

Your first question is, "What is supercooled water?" Supercooled water droplets are liquid water droplets at subfreezing temperatures. Water droplets in the air do not freeze at exactly 0^0C, but at somewhat lower temperatures, generally between -10^0C and -40^0C, depending on their purity and size. The purer and smaller the droplets, the lower the freezing temperature. When a supercooled water droplet strikes an object, in this case an airfoil or fuselage, the impact destroys the internal stability of the droplet and raises its freezing temperature. The result is aircraft icing.

There are three types of icing you must face – rime ice, clear ice and frost. Most frequently, we have a combination of the first two, clear and rime ice, occurring at the same time. Rime ice is a rough, milky, opaque ice formed by the instantaneous freezing of small supercooled droplets as they strike the aircraft. The fact that the droplets maintain their nearly spherical shape upon freezing and thus trap air between them gives the ice its opaque appearance and makes it porous and brittle. Rime ice does not adhere readily to exposed objects. Clear ice is a glossy, translucent ice formed by the relatively slow freezing of large supercooled water droplets. The large droplets spread out over the airfoil before completely freezing, forming a sheet of clear ice.

(Editor's Note: Pilots encounter rime ice most commonly in stable clouds containing small supercooled water droplets normally associated with warm fronts during fall, winter and spring. Also, it is wise to beware of areas widely covered with very cool or cold fogs. Rime ice is also formed in unstable clouds at temperatures colder than -15^0C. The most common temperatures for clear icing is 0^0 to -8^0C. Freezing rain is most frequently encountered during wintertime warm frontal situations. It is one of the most hazardous conditions encountered in aviation and should always be avoided.)

Frost is a light deposit of ice crystals which usually forms on the upper surfaces of parked aircraft by radiation cooling in the same manner as frost forms on cars and the ground. Frost is rarely encountered in flight. Do not underestimate the flight hazards of frost formations, however. Frost left on wings may act as sublimation nuclei (sublimation is the physical process by which water vapor passes directly to solid phase without passing through an intermediate liquid phase) during takeoff and climb and may grow to serious proportions. Frost left on windscreens may cause visual restriction or total loss of visibility.

Icing intensities are now standard throughout aviation forecasting. The National Coordinating Committee for Aviation Meterology established standard terms to be used within the United States in 1964. These are:

Trace of Icing. The presence of ice on the airframe is perceptible but the rate of accretion is nearly balanced by the rate of sublimation. The use of deicing equipment

is usually unnecessary. This is not a hazard, without the use of deicing equipment, unless encountered for an extended period of time.

Light Icing. Deicing equipment will dispose of the accumulation and occasional use of this equipment may be necessary. Otherwise, the rate of accretion is sufficient to create a hazard if flight is prolonged in this condition and is ordinarily sufficient to make diversionary action necessary.

Moderate Icing. Use of deicing equipment is mandatory, or immediate diversion is necessary. If deicing equipment is not used or is not available, the rate of accretion is excessive, making even short encounters under these conditions hazardous.

Heavy Icing. Under these conditions, deicing equipment fails to reduce or control the hazard. Immediate diversion is necessary.

Aircraft icing is generally limited to the area of the atmosphere where temperatures range from 0°C to -30°C. Icing has occurred at temperatures as low as -40°C but this is rare. This criterion alone restricts icing to the lower 30,000 feet of the atmosphere. Also, all cloud types which contain liquid water are confined to the area below 30,000 feet. The clouds above this height are cirriform or ice crystal clouds in which icing is rare.

Icing in the middle and low level stratus clouds is confined, on the average, to a layer between 3000 and 4000 feet thick. The intensity of icing usually encountered is either trace or light. Both rime and mixed (combination of rime and clear) icing are observed in stratiform clouds. Although the intensity is generally light, the hazard to flight in these clouds lies in the great horizontal extent of the clouds, often covering 200 to 300 miles, or more.

The zone of probable icing in cumuliform clouds is smaller horizontally but greater vertically than in stratiform clouds. Because cumuliform clouds have a larger distribution of droplet sizes, there is a more varied intensity of icing in these clouds. Generally, however, a trace of light icing will occur in small supercooled cumulus with light to moderate icing in larger cumulus and towering cumulus clouds. The heaviest icing occurs in towering cumulus just prior to the change to cumulonimbus. Although icing occurs at all levels in a building cumulus, it is most intense in the upper half of the cloud. This is the area where the largest concentration of supercooled water droplets are found. The type of icing found in cumuliform clouds is usually clear or mixed.

Frontal icing is also important. When warm moist air is forced aloft over a colder air mass, a warm frontal inversion exists. The warmer air being forced aloft condenses and forms the normal frontal clouds and precipitation. The raindrops falling from the warmer air into the colder air below will be cooled below 0°C. These droplets are then supercooled. The large droplets will produce a rapid accretion of clear ice in a short period of time. Warm frontal icing is widespread and can extend out as far as 300 miles in advance of a warm front. This is due to the shallow slope of warm fronts and the vast amount of layered clouds associated with them. Cold frontal icing is confined to a smaller area, usually within 100 miles to the rear of a cold front, in supercooled cumuliform clouds. Clear icing is more predominant than rime icing in this region. Light rime ice will be found in supercooled stratiform clouds that are found just to the rear of cold fronts.

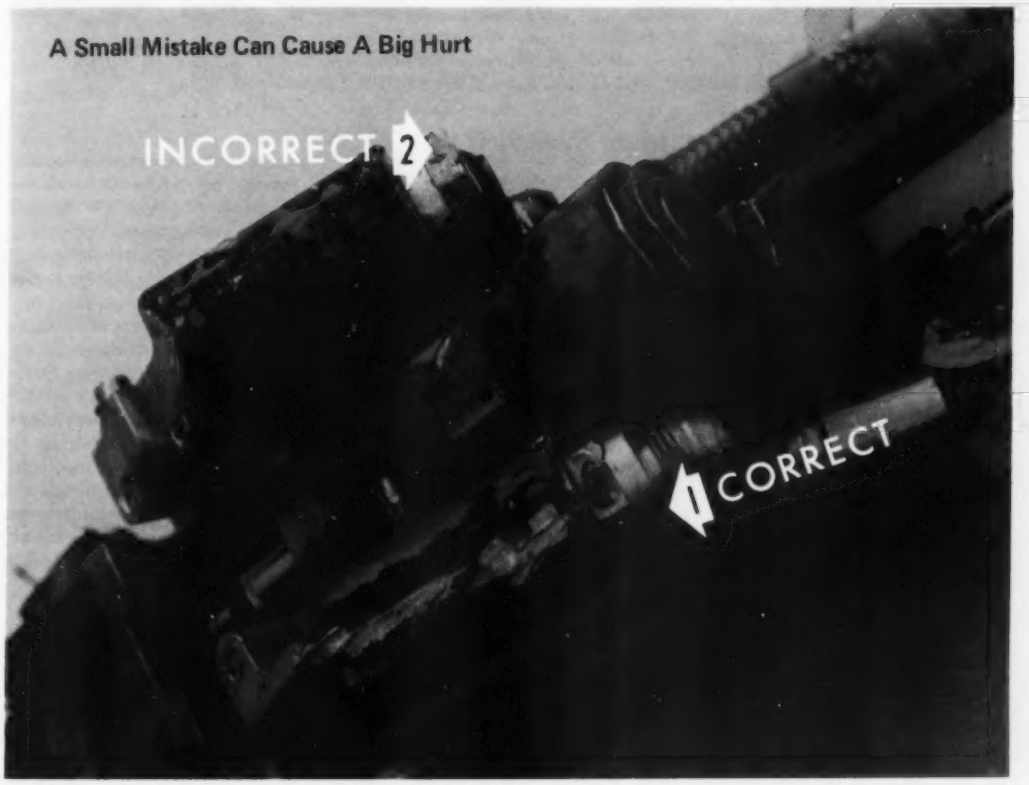
Rotary wing aircraft are also affected by icing. The following, taken from AWSM 105-39, Forecaster's Guide on Aircraft Icing, explains the problems encountered:

"The problems of icing on rotary wing aircraft are related to those involving wings and propellers. Rotor-icing is slightly different from propeller-icing because of the lower rotation speed of the rotors. Ice accretion on rotor blades also differs from that on fixed wings of conventional aircraft, due to the smaller scale of the helicopter wing, to the variation of airspeed with rotor blade span, the cyclic pitch-changing of the blades, and the cyclic variation of airspeed at any given point on the blade in conditions of forward flight. Ice accretion on the main rotor blades is more hazardous than ice on fixed wing aircraft because the helicopter, while hovering, normally operates very near its peak operational limits. Tests conducted by the Canadian National Aeronautical Establishment indicate that small amounts (about 3/16" thick) are more than sufficient to prevent a helicopter from maintaining height during hovering flight. Secondary effects are vibration, damage by flying ice, and limitation of throttle movement by premature stoppage. Icing also affects the tail rotor, control rods and links, and air intakes and filters. Other parts of the helicopter are comparatively poor collectors because of their relatively large scale and low airspeed."

Other serious hazards to be aware of are puddles of water, mud or slush on the runway. With the temperature of the airframe, especially the landing gear and flap hinges, below 0°C, water splashed by the wheels can form ice on control surfaces. This could cause the gear or flaps to remain frozen in a down position, or worse, allow the gear to retract and then become frozen in a retracted or semi-retracted position.

The operational effects of aircraft icing on your type of aircraft depend upon aircraft speed, wing and fuselage design and engine size. Know the causes of aircraft icing and how each forecast intensity affects your type aircraft and you will be prepared for the coming season.

MURPHY'S LAW *



THIS is a photo of an A-6 stabilizer actuator recovered at the scene of an aircraft crash. Note the small arrows stamped on each of the check valves (No. 1 and No. 2) installed in the actuator. Both arrows should indicate fluid flow *into* their section of the actuator, not in *opposite* directions as shown. The lower check valve (No. 1) is correctly installed but the upper check valve (No. 2) is reversed. When the flight hydraulic system suffered a complete failure, check valve No. 2 was the reason the combined hydraulic system was unable to provide for longitudinal control of the aircraft. Miniature check valve No. 2, having been installed in a reversed position, prevented fluid flow to the horizontal stabilizer-actuator servo port from the combined systems pressure side, thus causing loss of actuator control and subsequent loss of the aircraft.

There are many other locations in an aircraft's hydraulic system where similar type check valves are used, such as in the flaperon and rudder packages. Whenever there is a need for replacement the installer and quality assurance inspector must be alert to the proper fluid flow direction requirements. The MIMs for the A-6 aircraft reveal certain omissions in this area, so NAVAIRSYSCOMHQ has been requested to direct a complete review of appropriate maintenance manuals and publications and to insert quality assurance steps, leakage inspections, complete flow schematics and individual systems checks as necessary to ensure quality maintenance. ◄

* If an aircraft part can be installed incorrectly, someone will install it that way.

LETTERS

To err is human, but it takes a better excuse the second time.
Ace L.

Put The Pins In

FPO, San Francisco – Gentlemen: Regarding Short Snorts in your August 1970 issue "Put The Pins In." I'm sure the author was very self-satisfied with his noodle-lashing technique but I suggest that he was wrong. The postflight MRC cards for the A-4, NAVAIR 01-40AVC-6-2, of 1 January 1969, Card 1.1 indicates that the Plane Captain is specifically charged with installing the initiator safety pin and the ejection seat safety pins.

Pilot pocket checklists and the A-4 NATOPS do not address the problem at all except on preflight.

If the concept of NATOPS is to standardize procedures and they are stipulated in the Letter of Promulgation to be mandatory, then it seems to me that you are in conflict with NATOPS.

I'm intrigued by the fact that after all the guidance and mandatory procedures we have provided to our pilots these days we still go to great extremes to point the finger at our intrepid aviator when something goes awry.

My comments are not intended to detract from the significance of inadvertent canopy firings, unsafe egress from an aircraft or numerous other valid points made in the article but I believe you did lose some credibility.

CDR Z. J. Kowalskey, Jr., USN
C. O., VA-94

• WE GOOFED! Honest. The writer (who is not usually so short fused) became so carried away with the senselessness of the incident that he let emotions run wild. Now, in writing just as in aviation one can not afford to let emotion overrule good common sense. The Writers' NATOPS requires, in item No. 1 that facts be checked before typewriter is applied to paper. This wasn't done. We apologize to the A-4 pilot for the unearned, unwarranted chastisement and above all we *never* intend to be in conflict with NATOPS. We accept the lashes for the error.

Honest Assessment

Cherry Point, N. C. – I am an ex-A-4 driver. I am now slated to join the *Harrier* program. My present job is Officer-in-Charge, Marine Attack Squadron 513 (cadre). What I am writing about are my personal, professional views on the oxygen mask retention cup fasteners currently in use.

When I went to Meridian from Saufley as SNA (student naval aviator) in August of 1967 and was given all that new flight gear, I really had a problem with the oxygen mask fasteners and trying to get used to them. They were always awkward and even unreliable. Sometimes I had trouble getting them to stay in the helmet and sometimes they would pop loose in flight. I felt sure there had to be something better.

One day I noticed an instructor using bayonet fittings. I checked this out and decided these fittings were a lot more suitable than the present type. So I scrounged an old APH-5 helmet, fixed it up and scrounged some bayonet fittings. I've been using them over two years now, illegally of course, but extremely satisfactorily. I never have any problems. If you will check into this matter, the Air Force still uses the bayonet fittings and they use a helmet that is outstanding. Why not switch over to this flight gear? (This letter was prompted by the Accident Board's recommendations in the story "Honest Assessment," September, 1970 APPROACH.)

CAPT T. W. Griggs, III
Marine Aircraft Group 14
2nd MAW, FMFLANT

• This is a recognized area of dissent.

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

Incidentally, whenever a piece of personal survival equipment malfunctions in flight a Safety of Flight UR (Unsatisfactory Report) to NAVAIRSYSCOM (Naval Air Systems Command) will get attention and possibly trigger corrective action if the problem is widespread.

You will be interested to hear that the Navy is currently procuring a new design oxygen mask from Sierra which incorporates a single-point release bayonet fitting. The new fitting is much smaller and stronger than the old bayonet fitting and is reportedly much easier to handle. One hundred of these new masks are slated for fleet evaluation this fall. Use of a modification kit adapts the mask to the APH series helmets in a matter of minutes.

All Those Neat Pockets

Danang AB, Vietnam – In a moment of tranquility I was sitting back in my new nomex flight suit, contemplating nothing extraordinary, and entertaining myself snipping away at the stray threads that abound on the suits.

After snip-snipping around the myriad of weird pockets and secret hiding places, it occurred to this feeble brain that someone must have had a plan when he designed the suit. As a camel is alleged to be a horse designed by a committee, so, I decided, is the nomex suit the product of more than one super-creative brain.

Spurred to action by this flash of inference, I write, requesting that the mysteries of the nomex be erased forever, and that instructions be published in order that we of a less creative persuasion may exploit all of these neat pockets and secret hiding places in the manner intended by the designing committee.

LTCOL Michael Moriarty, USMC
VMO-2

• It could well be that there are others

in this wide world who share your questioning thoughts, so here goes:

2 Breast pockets and
2 Thigh pockets (uses not specified)
2 Shin pockets (also no specific uses)

MC-1 knife pocket – inside left thigh, Flare gun pocket – inside right thigh, Left sleeve pocket – for cigarettes, pencils, etc., Right shin pocket – for more pencils.

There are those who carry snacks, e.g., 1 banana in knife pocket, ham and cheese on pumpernickel in left shin pocket (right pocket if snacker is left handed), and very small survival kit containing makings for one very small martini to be carried next to the heart! Also, we are of the opinion that the member of the designing committee who was used as a model was probably very adept at climbing trees and swinging from vines (evidence the slightly longer than necessary front zipper and extra roomy legs).

A New Use For Old Stuff

NAS Oceana – I am writing this in the hope that it will appear in the Letters column of APPROACH because of the wide circulation of this magazine.

The idea is this. While going through our Quality Assurance files to remove old records, we came upon some photos originally taken for URs long since destroyed. Instead of destroying these photos we decided to use them in our squadron's campaign against unsafe procedures; the fight against FOD, etc.

We put the photos up in the maintenance shops and to say the least, the response was very enthusiastic. A sampling of comments indicated a renewed and an increased awareness by our maintenance personnel to the amount of damage that FOD and inattention to the job at hand can do to aircraft and support equipment.

These photographs depict fodded engines, broken parts, corrosion, defective parts received from supply, etc. We are convinced that these photos are playing a big part in our safety program inasmuch as they are pictures taken in our squadron, not of some other squadron.

Judging from our experience, we believe that other squadrons, using their old UR photos in the same manner that we have, should be able to derive similar benefits.

ADJ-1 D. L. Campbell
VF-32 Q/A

● We agree heartily with your belief that other squadrons can derive benefits by displaying their UR photographs in a like manner. May we suggest that a space be reserved on the squadron's bulletin board for a photo of the most current culprit of a UR message.

Lawn Mower Accident

FPO, San Francisco – In the July APPROACH "Notes from Your Flight Surgeon," there was an account of an unfortunate accident with a lawn mower. Many Navy people feel that wearing their working uniforms, including safety shoes, while working at home is a subtle form of cheating the Government. There are others, myself included, who believe that if it's issued to you, it should be worn when appropriate – at home or at play.

A few weeks ago a friend of mine had his foot run over by his rotary power lawn mower. He did not suffer any injury because he was wearing his Navy issue safety shoes. He would have lost all his toes and more had it not been for his safety shoe. The mower became hung up and when he pulled it free, it came up over his foot. Contact with his foot was solid enough to stall the mower engine.

Since most of our Navy men and officers lead active home lives, it would be appropriate, in my opinion, to give us an article occasionally on home safety – just to keep us on our toes (pun?) and alert.

AXC R. C. Lee, Jr., USN
Quality Assurance Chief, VS-33

● We couldn't agree with you more that safety shoes are in order when you mow the lawn. However, better have an extra pair for this purpose or your shoes soon won't meet required safety standards.

We are trying to program articles on off-the-job safety. For instance, recent issues of MECH, FATHOM and APPROACH carried articles on boating safety, motorcycle safety and the hazards of sunburn. We will try to include home-safe items also. ◄

This Christmas give APPROACH, always a safe gift.

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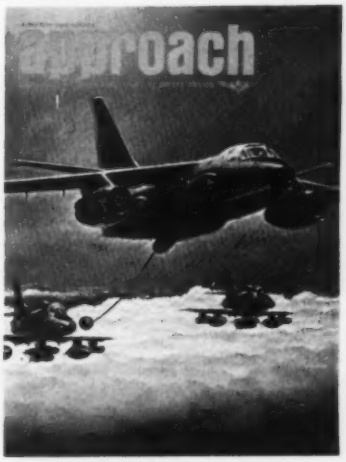

Vol. 16 **approach** No. 6

RADM W. N. Leonard
Commander, Naval Safety Center

Our product is safety, our process is education and our profit is measured in the preservation of lives and equipment and increased mission readiness.

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Credits

"At Your Service" could easily be our cover theme showing that very exacting and important moment of refueling inflight. Painting by R. G. Smith courtesy McDonnell Douglas. **Pgs 39, 40** Diagrams courtesy McDonnell Douglas *Product Support Digest.* **Pg 42** Photo courtesy NAS Brunswick, Maine.

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The Three 'R's'

EVERYONE knows that from the days of our forefathers the three "R's" have stood for "Readin', 'Ritin' and 'Rithmetic." In those days anyone well versed in the three "R's" was granted a certain recognition of approval or achievement. Today such recognition might necessarily entail a great deal more achievement; however, the original three "R's" are fundamental to the process of education and acquired knowledge.

The three "R's" presented here have application as an organizational or management tool for use in a number of areas relating to the military. It is felt that by their use, an aviation safety officer could build an effective safety program or an individual pilot could maintain a positive approach to aviation safety. Assemble your organization and consider the following formula for improved operations:

REFLECT REVIEW REVISE

R ead all available information on the subject.
E ncourage discussion.
F oster constructive thinking.
L odge the experience and accrued knowledge in your mind.
E duce ideas from everyone.
C ompile notes for further reference.
T alk is cheap – expend it.

R eassemble all facts on hand.
E nsure completeness.
V iew each item objectively.
I nstill the participants with the importance of the endeavor.
E nlist outside assistance if necessary.
W rite it up.

R atify existing sound principles.
E xtract wheat from the chaff.
V erify remaining material.
I nsist on strict adherence to the finalized information.
S elf-discipline must be emphasized.
E nthusiam is a must and will make the program continue to work.

By Major D. P. Hansen

Dieting Takes Guts.

Ace L.

For more on this subject check page 24.